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Scientists, Engineers, and Technicians in Nonmanufacturing Industries: 1990

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Detailed Statistical Tables

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Project Director: Joseph P. Gannon

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This report was prepared in the Division of Science Resources Studies (SRS) by Joseph P. Gannon, Science Resources Analyst, Science and Engineering Personnel Program (PER), under the general direction of Carolyn Shettle, Program Director, PER. Secretarial and other support services were provided by Simone Keith. The Editor was Millicent V. Gough, and the Editorial Assistant was Julia H. Harriston, under the direction of Richard E. Morrison, Publications Manager, SRS. Kenneth M. Brown, Director, SRS, provided overall guidance.

Contents

Section: **Page**

I. General Notes 1

II. Detailed Statistical Tables 3

Appendix:

Technical Notes 77

I. General Notes

In this report, estimates are presented on the total numbers of scientists, engineers, and technicians (SETs) who were employed in nonmanufacturing industries in 1990. The estimates were developed from the Labor Department's Occupational Employment Statistics (OES) Survey, a Federal/State program that produces national and State estimates of employment by industry for nonfarm wage and salary workers. The Bureau of Labor Statistics (BLS) has the primary responsibility for developing OES survey procedures and providing technical guidance and assistance with survey problems. State Employment Security Agencies implement the survey at State levels and prepare current and projected employment statistics for these labor markets. Some States also prepare sub-State estimates.

The National Science Foundation (NSF) has enhanced the BLS effort since 1977 by financing the collection of full details on the types of scientific and technical jobs filled by industry. Analysis of this information provides insight into the dynamics of the labor market.

Requests for previously published data and additional information should be addressed as follows:

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National Science Foundation
1800 G Street, N.W., Room L-609
Washington, D.C. 20550
(202) 634-4287

SECTION II. DETAILED STATISTICAL TABLES

NOTE

Industries identified in the tables of this report are from the "Numerical List of Short Titles" in the ***Standard Industrial Classification (SIC) Manual,*** revised 1987 edition. The numbers of scientists, engineers, and technicians (SETs) for a few industries at the 2-digit SIC level in 1990 (tables A-2 through A-4) differ from those in the prior report on nonmanufacturing industries for 1987 because the industries were recoded. Greater noncomparability occurred at the 3-digit level of detail (tables A-1 and A-5) because of more extensive recoding at that level. The numerous industry title changes did not affect the comparability of the 1990 and 1987 occupational estimates. The data on tables A-6 through A-9 cover R&D personnel, and thus were not available in 1987.

Estimates in the tables of this report may be compared with those for 1987 only after consulting the 1987 SIC revisions to determine industry comparability.

List of Tables

Table **Page**

A-1. Scientific, engineering, and technical (SET) personnel and SET managers in nonmanufacturing industries, by detailed industry of employment: 1990 7

A-2. Scientists in nonmanufacturing industries, by broad industry group of employment and detailed occupation: 1990 15

A-3. Engineers in nonmanufacturing industries, by broad industry group of employment and detailed occupation: 1990 16

A-4. Technicians in nonmanufacturing industries, by broad industry group of employment and detailed occupation: 1990 18

A-5. Scientists, engineers, and technicians in nonmanufacturing industries, as a percentage of total industry employment, and the relative error: 1990 20

A-6. R&D scientific, engineering, and technical (SET) personnel and SET managers in nonmanufacturing industries, by detailed industry of employment: 1990 69

A-7. R&D scientists in nonmanufacturing industries, by broad industry group of employment and detailed occupation: 1990 73

A-8. R&D engineers in nonmanufacturing industries, by broad industry group of employment and detailed occupation: 1990 74

A-9. R&D technicians in nonmanufacturing industries, by broad industry group of employment and detailed occupation: 1990 75

Table A-1. Scientific, engineering, and technical (SET) personnel and SET managers in nonmanufacturing industries, by detailed industry of employment: 1990

[Filled jobs in thousands]

Page 1 of 8

Detailed industry	Total SET personnel		SET personnel managers		Scientists		Engineers		Technicians	
	Number	Pct	Number	Pct	Number	Pct	Number	Pct	Number	Pct
Total nonmanufacturing............	1,690.1	100.0	115.5	100.0	424.0	100.0	443.8	100.0	706.8	100.0
Mining..................................	78.4	4.6	3.9	3.3	21.0	5.0	26.4	6.0	27.1	3.8
Metal mining..........................	6.5	0.4	0.3	0.2	2.3	0.6	1.6	0.4	2.3	0.3
Iron ores..........................	0.3	<	<	<	0.1	<	0.2	<	0.1	<
Copper ores........................	1.0	0.1	0.1	0.1	0.2	0.1	0.4	0.1	0.4	0.1
Lead and zinc ores.................	0.1	<	<	<	0.1	<	0.1	<	<	<
Gold and silver ores...............	3.0	0.2	0.1	0.1	1.0	0.2	0.7	0.2	1.2	0.2
Ferroalloy ores, except vanadium.....	0.3	<	<	<	0.1	<	0.1	<	0.1	<
Metal mining services..............	1.1	0.1	<	<	0.8	0.2	0.1	<	0.2	<
Misc. metal ores, n.e.c............	0.6	<	<	<	0.2	<	0.1	<	0.3	<
Coal mining...........................	5.1	0.3	0.4	0.3	0.7	0.2	1.9	0.4	2.1	0.3
Bituminous coal and lignite mining...	4.8	0.3	0.4	0.3	0.6	0.1	1.8	0.4	2.0	0.3
Anthracite mining..................	<	<	0.0	0.0	0.0	0.0	<	<	0.0	0.0
Coal mining services...............	0.3	<	<	<	<	<	0.1	<	0.1	<
Oil and gas extraction................	63.4	3.8	2.9	2.5	17.4	4.1	21.9	4.9	21.1	3.0
Crude petroleum and natural gas......	47.5	2.8	2.0	1.7	14.5	3.4	15.2	3.4	15.8	2.2
Natural gas liquids................	0.9	0.1	0.1	0.1	0.3	0.1	0.3	0.1	0.2	<
Oil and gas field services...........	15.0	0.9	0.9	0.7	2.6	0.6	6.4	1.4	5.1	0.7
Nonmetallic minerals, except fuels.....	3.4	0.2	0.2	0.2	0.5	0.1	1.0	0.2	1.6	0.2
Dimension stone....................	<	<	0.0	0.0	0.0	0.0	<	<	<	<
Crushed and broken stone............	0.8	<	0.1	0.1	0.1	<	0.3	0.1	0.3	<
Sand and gravel....................	0.5	<	0.1	0.1	0.1	<	0.2	<	0.2	<
Clay, ceramic, and refractory minerals...........................	0.8	<	<	<	0.1	<	0.1	<	0.5	0.1
Chemical and fertilizer minerals.....	1.1	0.1	0.1	0.1	0.1	<	0.3	0.1	0.5	0.1
Nonmetallic minerals services........	0.1	<	0.0	0.0	0.1	<	<	<	<	<
Misc. nonmetallic minerals...........	0.2	<	<	<	<	<	0.1	<	0.1	<

See explanatory information, if any, and SOURCE at end of table.

Table A-1. Scientific, engineering, and technical (SET) personnel and SET managers in nonmanufacturing industries, by detailed industry of employment: 1990

[Filled jobs in thousands]

Page 2 of 8

Detailed industry	Total SET personnel		SET personnel managers		Scientists		Engineers		Technicians	
	Number	Pct	Number	Pct	Number	Pct	Number	Pct	Number	Pct
Construction............................	72.1	4.3	4.4	3.8	1.2	0.3	33.8	7.6	32.7	4.6
General building contractors...........	22.5	1.3	2.0	1.8	0.6	0.1	11.4	2.6	8.4	1.2
Residential building construction....	4.3	0.3	0.3	0.3	0.1	<	1.0	0.2	2.9	0.4
Operative builders.................	0.6	<	0.1	<	<	<	0.2	0.1	0.3	<
Nonresidential building excluding building.........................	17.5	1.0	1.7	1.5	0.4	0.1	10.2	2.3	5.2	0.7
Heavy construction, excluding building.........................	22.4	1.3	1.7	1.5	0.3	0.1	13.1	3.0	7.2	1.0
Highway and street construction......	3.1	0.2	0.3	0.2	0.1	<	1.6	0.4	1.2	0.2
Heavy construction, except highway...	19.3	1.1	1.5	1.3	0.3	0.1	11.6	2.6	6.0	0.8
Special trade contractors..............	27.3	1.6	0.7	0.6	0.3	0.1	9.3	2.1	17.0	2.4
Plumbing, heating, air conditioning..	10.4	0.6	0.1	0.1	<	<	4.3	1.0	6.0	0.8
Electrical work.....................	10.6	0.6	0.3	0.2	0.1	<	4.2	0.9	6.0	0.8
Masonry, stonework, and plastering...	0.3	<	<	<	<	<	<	<	0.2	<
Carpentry and floor work............	0.2	<	0.0	0.0	0.0	0.0	<	<	0.2	<
Roofing, siding, and sheet-metal work............................	0.5	<	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.1
Concrete work......................	0.2	<	0.0	0.0	0.0	0.0	0.1	<	0.1	<
Water-well drilling................	<	<	0.0	0.0	0.0	0.0	0.0	0.0	<	<
Misc. special trade contractors......	5.0	0.3	0.2	0.2	0.1	<	0.6	0.1	4.0	0.6
Finance, insurance, and real estate......	211.0	12.5	20.2	17.4	107.7	25.4	16.1	3.6	67.1	9.5
Depository institutions...............	59.1	3.5	6.9	6.0	32.6	7.7	2.5	0.6	17.1	2.4
Central reserve depositories.........	3.1	0.2	0.5	0.4	2.0	0.5	0.1	<	0.6	0.1
Commercial banks....................	43.8	2.6	4.6	4.0	24.8	5.8	1.9	0.4	12.4	1.8
Savings institutions................	7.0	0.4	0.8	0.7	3.7	0.9	0.2	<	2.3	0.3
Credit unions.......................	1.4	0.1	0.3	0.2	0.6	0.1	<	<	0.5	0.1
Foreign banks and branches and agencies.........................	1.0	0.1	0.1	0.1	0.6	0.1	<	<	0.2	<

See explanatory information, if any, and SOURCE at end of table.

Table A-1. Scientific, engineering, and technical (SET) personnel and SET managers in nonmanufacturing industries, by detailed industry of employment: 1990

[Filled jobs in thousands]

Page 3 of 8

Detailed industry	Total SET personnel		SET personnel managers		Scientists		Engineers		Technicians	
	Number	Pct	Number	Pct	Number	Pct	Number	Pct	Number	Pct
Finance, insurance, and real estate--Continued										
Functions closely related to banking.	3.0	0.2	0.6	0.5	1.0	0.2	0.2	<	1.1	0.2
Nondepository institutions............	7.9	0.5	0.9	0.8	3.6	0.9	0.3	0.1	3.1	0.4
Federal and federally sponsored credit............................	1.1	0.1	0.2	0.1	0.6	0.1	<	<	0.3	<
Personal credit institutions.........	1.5	0.1	0.1	0.1	0.7	0.2	<	<	0.7	0.1
Business credit institutions.........	2.7	0.2	0.3	0.3	1.2	0.3	0.2	0.1	1.0	0.1
Mortgage bankers and brokers.........	2.6	0.2	0.3	0.3	1.2	0.3	0.1	<	1.0	0.1
Security and commodity brokers.........	19.2	1.1	1.8	1.5	10.4	2.5	0.4	0.1	6.7	0.9
Security brokers and dealers.........	13.9	0.8	1.4	1.2	7.3	1.7	0.3	0.1	4.9	0.7
Commodity contracts, brokers, and dealers......................	0.6	<	0.1	0.1	0.3	0.1	<	<	0.2	<
Security and commodity exchanges.....	0.6	<	<	<	0.3	0.1	<	<	0.2	<
Security and commodity services......	4.2	0.2	0.3	0.3	2.5	0.6	0.1	<	1.4	0.2
Insurance carriers....................	90.2	5.3	7.7	6.7	47.3	11.2	6.1	1.4	29.1	4.1
Life insurance......................	40.0	2.4	3.0	2.6	22.7	5.4	1.2	0.3	13.0	1.8
Medical service and health insurance.........................	17.2	1.0	1.7	1.5	10.4	2.4	0.4	0.1	4.8	0.7
Fire, marine, and casualty insurance.........................	29.7	1.8	2.7	2.3	12.8	3.0	4.5	1.0	9.8	1.4
Surety insurance....................	0.9	0.1	0.1	0.1	0.4	0.1	<	<	0.3	<
Title insurance.....................	0.7	<	0.1	<	0.2	0.1	<	<	0.5	0.1
Pension, health, and welfare funds...	1.6	0.1	0.1	0.1	0.8	0.2	<	<	0.6	0.1
Insurance carriers, n.e.c...........	0.1	<	<	<	<	<	0.0	0.0	<	<

See explanatory information, if any, and SOURCE at end of table.

Table A-1. Scientific, engineering, and technical (SET) personnel and SET managers in nonmanufacturing industries, by detailed industry of employment: 1990

[Filled jobs in thousands]

Page 4 of 8

Detailed industry	Total SET personnel		SET personnel managers		Scientists		Engineers		Technicians	
	Number	Pct	Number	Pct	Number	Pct	Number	Pct	Number	Pct
Finance, insurance, and real estate--Continued										
Insurance agents, brokers, and service	14.6	0.9	0.9	0.8	6.6	1.6	2.1	0.5	4.9	0.7
Insurance agents, brokers, and service	14.6	0.9	0.9	0.8	6.6	1.6	2.1	0.5	4.9	0.7
Real estate	7.2	0.4	1.0	0.9	1.4	0.3	2.7	0.6	2.1	0.3
Real estate operators and lessors	2.6	0.2	0.4	0.4	0.5	0.1	1.1	0.3	0.5	0.1
Real estate agents and managers	2.8	0.2	0.4	0.3	0.7	0.2	0.9	0.2	0.8	0.1
Title abstract offices	0.2	<	<	<	<	<	0.0	0.0	0.1	<
Subdividers and developers	1.6	0.1	0.2	0.2	0.2	<	0.6	0.1	0.6	0.1
Holding and other investment offices	12.7	0.8	0.9	0.8	5.7	1.3	1.9	0.4	4.1	0.6
Holding offices	10.0	0.6	0.9	0.7	4.0	0.9	1.8	0.4	3.3	0.5
Investment offices	0.3	<	0.0	0.0	0.2	0.1	0.0	0.0	0.1	<
Trusts	1.6	0.1	0.1	0.1	1.1	0.3	0.1	<	0.5	0.1
Misc. investing	0.7	<	<	<	0.4	0.1	0.1	<	0.3	<
Services	1,328.7	78.6	87.1	75.4	294.2	69.4	367.4	82.8	579.9	82.1
Hotels and other lodging places	7.7	0.5	0.0	0.0	0.9	0.2	5.1	1.1	1.8	0.3
Hotels and motels	7.7	0.5	0.0	0.0	0.9	0.2	5.1	1.1	1.8	0.3
Camps and recreational vehicle parks	<	<	0.0	0.0	<	<	<	<	0.0	0.0
Personal services	0.9	0.1	0.0	0.0	0.3	0.1	0.3	0.1	0.4	0.1
Laundry, cleaning, and garment services	0.6	<	0.0	0.0	0.1	<	0.3	0.1	0.3	<
Photographic studios, portrait	<	<	0.0	0.0	<	<	0.0	0.0	<	<
Beauty shops	<	<	0.0	0.0	<	<	0.0	0.0	0.0	0.0
Funeral service and crematories	<	<	0.0	0.0	<	<	0.0	0.0	<	<

See explanatory information, if any, and SOURCE at end of table.

Table A-1. Scientific, engineering, and technical (SET) personnel and SET managers in nonmanufacturing industries, by detailed industry of employment: 1990

[Filled jobs in thousands]

Page 5 of 8

Detailed industry	Total SET personnel		SET personnel managers		Scientists		Engineers		Technicians	
	Number	Pct	Number	Pct	Number	Pct	Number	Pct	Number	Pct
Services--Continued										
Misc. personal service	0.2	<	0.0	0.0	0.1	<	0.0	0.0	0.1	<
Business services	427.2	25.3	26.2	22.7	103.0	24.3	93.3	21.0	204.7	29.0
Advertising	3.3	0.2	0.6	0.5	2.0	0.5	0.1	<	0.6	0.1
Credit reporting and collection	3.0	0.2	0.4	0.3	0.8	0.2	0.3	0.1	1.5	0.2
Mailing, reproduction, and stenographic	4.2	0.3	0.2	0.2	0.6	0.1	0.2	<	3.3	0.5
Services to buildings	1.6	0.1	0.1	0.1	0.1	<	0.7	0.1	0.8	0.1
Misc. equipment rental and leasing	3.1	0.2	0.3	0.2	0.3	0.1	0.9	0.2	1.6	0.2
Personnel supply services	65.9	3.9	1.0	0.9	4.5	1.1	23.1	5.2	37.3	5.3
Computer and data processing services	316.9	18.7	22.3	19.3	91.7	21.6	64.2	14.5	138.6	19.6
Misc. business services	29.1	1.7	1.4	1.2	2.9	0.7	3.8	0.9	21.1	3.0
Auto repair, services, and parking	1.3	0.1	0.2	0.1	0.3	0.1	0.1	<	0.7	0.1
Automobile rentals, no drivers	0.9	0.1	0.1	0.1	0.2	<	<	<	0.5	0.1
Automobile parking	<	<	0.0	0.0	<	<	0.0	0.0	<	<
Automobile repair shops	0.2	<	<	<	<	<	0.1	<	0.1	<
Automobile services, except repair	0.1	<	<	<	<	<	0.1	<	<	<
Misc. repair services	3.5	0.2	0.3	0.3	0.2	<	1.7	0.4	1.3	0.2
Electrical repair shops	1.9	0.1	0.1	0.1	0.1	<	1.2	0.3	0.6	0.1
Misc. repair shops	1.6	0.1	0.2	0.2	0.1	<	0.6	0.1	0.7	0.1
Motion pictures	10.1	0.6	0.0	0.0	1.2	0.3	1.2	0.3	7.6	1.1
Motion picture production and services	9.4	0.6	0.0	0.0	1.1	0.3	1.1	0.3	7.2	1.0
Motion picture distribution and services	0.4	<	0.0	0.0	0.1	<	0.1	<	0.3	<
Motion picture theaters	0.1	<	0.0	0.0	<	<	<	<	<	<

See explanatory information, if any, and SOURCE at end of table.

Table A-1. Scientific, engineering, and technical (SET) personnel and SET managers in nonmanufacturing industries, by detailed industry of employment: 1990

[Filled jobs in thousands]

Page 6 of 8

Detailed industry	Total SET personnel		SET personnel managers		Scientists		Engineers		Technicians	
	Number	Pct	Number	Pct	Number	Pct	Number	Pct	Number	Pct
Services--Continued										
Video tape rental	0.1	<	0.0	0.0	<	<	<	<	0.1	<
Amusement and recreation services	4.0	0.2	0.0	0.0	0.5	0.1	0.5	0.1	2.9	0.4
Dance studios, schools, and halls	<	<	0.0	0.0	<	<	0.0	0.0	0.0	0.0
Producers, orchestras, and entertainers	1.2	0.1	0.0	0.0	0.1	<	0.1	<	1.0	0.1
Bowling centers	<	<	0.0	0.0	<	<	0.0	0.0	<	<
Commercial sports	0.7	<	0.0	0.0	0.1	<	0.1	<	0.6	0.1
Misc. amusement, recreation services	2.0	0.1	0.0	0.0	0.3	0.1	0.4	0.1	1.3	0.2
Health services	21.2	1.3	1.6	1.4	16.2	3.8	0.3	0.1	3.1	0.4
Offices and clinics of medical doctors	6.0	0.4	0.4	0.3	4.6	1.1	0.1	<	1.0	0.1
Offices and clinics of dentists	0.1	<	0.1	<	<	<	0.0	0.0	<	<
Offices of osteopathic physicians	<	<	0.0	0.0	<	<	0.0	0.0	0.0	0.0
Offices of other health practitioners	4.4	0.3	0.1	0.1	4.3	1.0	0.0	0.0	0.1	<
Nursing and personal care facilities	1.3	0.1	0.2	0.2	0.8	0.2	0.1	<	0.2	<
Medical and dental laboratories	4.1	0.2	0.5	0.4	2.5	0.6	0.1	<	1.1	0.2
Home health care services	0.3	<	0.1	0.1	0.1	<	0.0	0.0	0.1	<
Health and allied services, n.e.c	4.8	0.3	0.3	0.3	3.9	0.9	<	<	0.6	0.1
Legal services	1.6	0.1	0.3	0.2	0.8	0.2	<	<	0.5	0.1
Social services	11.2	0.7	0.8	0.7	8.2	1.9	0.1	<	2.0	0.3
Individual and family services	5.7	0.3	0.5	0.4	4.3	1.0	<	<	1.0	0.1
Job training and related services	1.2	0.1	0.1	0.1	0.7	0.2	0.1	<	0.3	<
Child day care services	0.2	<	<	<	0.1	<	0.0	0.0	<	<
Residential care	2.1	0.1	0.1	0.1	1.8	0.4	<	<	0.1	<

See explanatory information, if any, and SOURCE at end of table.

Table A-1. Scientific, engineering, and technical (SET) personnel and SET managers in nonmanufacturing industries, by detailed industry of employment: 1990

[Filled jobs in thousands]

Page 7 of 8

Detailed industry	Total SET personnel		SET personnel managers		Scientists		Engineers		Technicians	
	Number	Pct	Number	Pct	Number	Pct	Number	Pct	Number	Pct
Services--Continued										
Social services, n.e.c.	2.0	0.1	0.1	0.1	1.3	0.3	<	<	0.5	0.1
Museums, botanical, zoological gardens	1.3	0.1	0.2	0.2	0.7	0.2	0.1	<	0.3	<
Museums and art galleries	0.8	<	0.1	0.1	0.4	0.1	<	<	0.2	<
Botanical and zoological gardens	0.6	<	0.1	0.1	0.3	0.1	<	<	0.1	<
Membership organizations	8.4	0.5	0.9	0.8	4.2	1.0	0.8	0.2	2.5	0.4
Business associations	3.3	0.2	0.4	0.3	1.8	0.4	0.4	0.1	0.7	0.1
Professional organizations	1.7	0.1	0.2	0.2	0.6	0.2	0.3	0.1	0.6	0.1
Labor organizations	0.7	<	<	<	0.4	0.1	<	<	0.2	<
Civic and social associations	1.8	0.1	0.2	0.1	0.9	0.2	0.1	<	0.6	0.1
Political organizations	0.1	<	0.0	0.0	<	<	0.0	0.0	0.1	<
Membership organizations, n.e.c.	0.9	0.1	0.1	0.1	0.4	0.1	<	<	0.3	<
Engineering and management services	816.7	48.3	55.9	48.4	149.9	35.4	262.5	59.2	348.3	49.3
Engineering and architectural services	468.4	27.7	28.2	24.4	23.4	5.5	171.3	38.6	245.6	34.8
Accounting, auditing, and bookkeeping	14.9	0.9	0.6	0.5	9.5	2.2	0.6	0.1	4.2	0.6
Research and testing services	232.4	13.8	18.3	15.8	77.5	18.3	66.2	14.9	70.4	10.0
Management and public relations	100.9	6.0	8.8	7.6	39.5	9.3	24.4	5.5	28.2	4.0

See explanatory information, if any, and SOURCE at end of table.

Table A-1. Scientific, engineering, and technical (SET) personnel and SET managers in nonmanufacturing industries, by detailed industry of employment: 1990

[Filled jobs in thousands]

Page 8 of 8

Detailed industry	Total SET personnel		SET personnel managers		Scientists		Engineers		Technicians	
	Number	Pct	Number	Pct	Number	Pct	Number	Pct	Number	Pct
Services--Continued										
Services n.e.c......................	13.6	0.8	0.7	0.6	7.8	1.8	1.3	0.3	3.8	0.5

NOTE: Because of rounding, components may not add to totals.

KEY:
0 = Data were collected and the reported number or value was zero.
< = The estimated actual value is less than 50 for numbers, and less than 0.05 for percents.
N.e.c. = Not elsewhere classified

SOURCE: National Science Foundation/SRS, using data from U.S. Department of Labor/Bureau of Labor Statistics, Occupational Employment Statistics Survey

Table A-2. Scientists in nonmanufacturing industries, by broad industry group of employment and detailed occupation: 1990

[Filled jobs in thousands]

Page 1 of 1

Broad industry group of employment	Total	Physical	Mathematical	Life	Social	Computer
Total nonmanufacturing	424.1	73.5	61.5	30.9	54.5	203.7
Mining	21.0	16.2	0.2	0.1	0.4	4.1
Metal mining	2.4	2.2	0.0	<	0.0	0.1
Coal mining	0.7	0.5	0.0	0.1	0.0	0.1
Oil and gas extraction	17.4	13.1	0.2	0.1	0.4	3.7
Nonmetallic minerals, except fuels	0.6	0.4	0.0	<	0.0	0.1
Construction	1.2	0.1	0.1	<	0.0	1.0
General building contractors	0.6	<	<	<	0.0	0.5
Heavy construction, excluding building	0.3	0.1	<	<	0.0	0.3
Special trade contractors	0.3	0.1	0.0	0.0	0.0	0.2
Finance, insurance, and real estate	107.6	0.6	28.1	0.2	7.1	71.6
Depository institutions	32.6	0.0	5.8	<	2.1	24.7
Nondepository institutions	3.7	<	0.7	0.0	0.2	2.7
Security and commodity brokers	10.5	0.1	1.9	0.0	2.4	6.1
Insurance carriers	47.3	<	16.2	<	1.3	29.7
Insurance agents, brokers, and service	6.6	0.0	2.5	0.0	0.2	3.9
Real estate	1.4	<	0.1	<	0.2	1.0
Holding and other investment offices	5.6	0.5	0.9	0.1	0.7	3.5
Services	294.3	56.5	33.2	30.5	47.0	127.0
Hotels and other lodging places	0.9	0.0	0.0	<	0.0	0.9
Personal services	0.2	0.0	<	0.0	0.0	0.2
Business services	103.0	3.0	9.2	0.2	3.5	87.0
Auto repair, services, and parking	0.3	0.0	0.0	0.0	0.0	0.3
Misc. repair services	0.2	<	0.0	<	0.0	0.1
Motion pictures	1.2	0.0	0.0	0.0	0.0	1.2
Amusement and recreation services	0.5	0.0	0.0	0.1	0.0	0.5
Health services	16.2	0.7	0.1	3.2	10.4	1.8
Legal services	0.8	0.1	0.1	0.0	<	0.6
Social services	8.2	<	0.5	0.2	6.4	1.0
Museums, botanical, zoological gardens	0.7	0.1	0.0	0.3	0.1	0.1
Membership organizations	4.2	0.1	0.9	0.5	1.1	1.6
Engineering and management services	149.9	48.6	19.5	25.8	24.9	31.1
Services n.e.c.	7.8	3.8	2.9	0.2	0.4	0.5

NOTE: Because of rounding, components may not add to totals.

KEY:
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< = The estimated actual value is less than 50.
N.e.c. = Not elsewhere classified

SOURCE: National Science Foundation/SRS, using data from U.S. Department of Labor/Bureau of Labor Statistics, Occupational Employment Statistics Survey

Table A-3. Engineers in nonmanufacturing industries, by broad industry group of employment and detailed occupation: 1990

[Filled jobs in thousands]

Page 1 of 2

Broad industry group of employment	Total	Aero-nau-tical	Civil	Elec-trical/ elec-tronics	Computer	Mechan-ical	Indus-trial	Sales	Other
Total nonmanufacturing.........	444.1	16.6	82.3	83.9	68.0	58.5	13.7	15.8	105.4
Mining.............................	26.5	0.0	1.2	0.8	0.5	1.8	0.9	1.7	19.6
Metal mining......................	1.6	0.0	0.1	0.0	<	0.1	<	0.0	1.4
Coal mining.......................	1.9	0.0	0.1	0.0	<	0.1	0.1	0.0	1.6
Oil and gas extraction............	21.9	0.0	1.0	0.8	0.4	1.5	0.7	1.7	15.8
Nonmetallic minerals, except fuels.	1.0	0.0	0.1	0.0	<	0.1	0.1	0.0	0.7
Construction.......................	33.9	0.0	12.5	6.3	0.3	4.5	1.4	4.4	4.5
General building contractors.......	11.4	0.0	6.8	0.3	0.1	1.8	0.9	0.2	1.3
Heavy construction, excluding building.......................	13.2	0.0	5.3	2.0	0.1	2.2	0.5	0.2	2.7
Special trade contractors..........	9.3	0.0	0.3	4.0	0.1	0.5	<	4.0	0.5
Finance, insurance, and real estate..	16.1	0.0	0.8	0.8	4.6	1.2	0.7	0.0	8.2
Depository institutions............	2.5	0.0	0.0	0.3	1.6	0.0	0.2	0.0	0.4
Nondepository institutions.........	0.3	0.0	0.0	0.1	0.2	0.0	<	0.0	<
Security and commodity brokers.....	0.4	0.0	0.0	<	0.3	0.0	0.0	0.0	0.1
Insurance carriers................	6.1	0.0	0.3	0.0	1.7	0.1	0.1	0.0	3.8
Insurance agents, brokers, and service........................	2.1	0.0	0.0	0.0	0.3	0.0	<	0.0	1.8
Real estate.......................	2.7	0.0	0.4	0.0	0.1	1.1	0.2	0.0	0.8
Holding and other investment offices........................	1.9	0.0	0.0	0.3	0.3	0.0	0.1	0.0	1.2

See explanatory information, if any, and SOURCE at end of table.

Table A-3. Engineers in nonmanufacturing industries, by broad industry group of employment and detailed occupation: 1990

[Filled jobs in thousands]

Page 2 of 2

Broad industry group of employment	Total	Aero-nau-tical	Civil	Elec-trical/ elec-tronics	Computer	Mechan-ical	Indus-trial	Sales	Other
Services............................	367.6	16.6	67.8	76.0	62.6	51.0	10.8	9.7	73.2
Hotels and other lodging places....	5.1	0.0	0.0	0.7	0.3	2.1	0.0	0.0	2.0
Personal services..................	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Business services..................	93.4	2.4	0.0	17.8	42.1	7.2	1.9	5.4	16.5
Auto repair, services, and parking.	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Misc. repair services..............	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7
Motion pictures....................	1.2	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.4
Amusement and recreation services..	0.5	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.2
Health services....................	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Legal services.....................	<	0.0	0.0	0.0	<	0.0	0.0	0.0	0.0
Social services....................	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Museums, botanical, zoological gardens..........................	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Membership organizations...........	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
Engineering and management services	262.5	14.1	67.6	56.2	20.1	41.6	8.8	4.2	49.9
Services n.e.c.....................	1.3	0.0	0.2	0.1	0.1	<	<	0.1	0.8

NOTE: Because of rounding, components may not add to totals.

KEY:
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< = The estimated actual value is less than 50.
N.e.c. = Not elsewhere classified

SOURCE: National Science Foundation/SRS, using data from U.S. Department of Labor/Bureau of Labor Statistics, Occupational Employment Statistics Survey

Table A-4. Technicians in nonmanufacturing industries, by broad industry group of employment and detailed occupation: 1990

[Filled jobs in thousands]

Page 1 of 2

Broad industry group of employment	Total	Computer programmer	Drafter	Science	Engineering				
					Total	Electrical/ electronics	Mechanical	Civil	Other
Total nonmanufacturing.........	706.9	238.1	174.7	53.4	240.8	67.3	21.4	31.9	120.2
Mining..............................	27.2	3.1	3.0	10.5	10.6	1.6	0.7	0.5	7.7
Metal mining.......................	2.3	0.1	0.3	1.1	0.9	0.0	0.0	<	0.8
Coal mining........................	2.2	0.2	0.3	0.4	1.2	0.0	0.0	0.1	1.2
Oil and gas extraction.............	21.1	2.7	2.3	8.0	8.1	1.6	0.7	0.4	5.4
Nonmetallic minerals, except fuels.	1.6	0.1	0.1	1.0	0.4	0.0	0.0	<	0.4
Construction........................	32.6	1.2	18.1	0.1	13.3	5.5	0.6	2.2	5.0
General building contractors.......	8.4	0.5	5.3	<	2.6	0.2	0.3	1.0	1.1
Heavy construction, excluding building..........................	7.2	0.4	2.4	<	4.4	0.5	0.2	1.0	2.8
Special trade contractors..........	17.0	0.2	10.5	<	6.3	4.9	<	0.2	1.1
Finance, insurance, and real estate..	67.0	61.6	1.1	1.6	2.7	0.0	0.0	0.0	2.7
Depository institutions............	17.1	16.6	0.1	<	0.5	0.0	0.0	0.0	0.5
Nondepository institutions.........	3.0	3.0	<	0.0	<	0.0	0.0	0.0	<
Security and commodity brokers.....	6.7	6.6	0.0	0.0	<	0.0	0.0	0.0	<
Insurance carriers.................	29.1	27.2	0.1	1.0	0.8	0.0	0.0	0.0	0.8
Insurance agents, brokers, and service...........................	4.9	4.5	0.1	0.1	0.3	0.0	0.0	0.0	0.3
Real estate........................	2.1	0.9	0.5	0.0	0.7	0.0	0.0	0.0	0.7
Holding and other investment offices..........................	4.1	2.8	0.3	0.5	0.5	0.0	0.0	0.0	0.5

See explanatory information, if any, and SOURCE at end of table.

Table A-4. Technicians in nonmanufacturing industries, by broad industry group of employment and detailed occupation: 1990

[Filled jobs in thousands]

Page 2 of 2

Broad industry group of employment	Total	Computer programmer	Drafter	Science	Engineering				
					Total	Electrical/ electronics	Mechanical	Civil	Other
Services............................	580.0	172.2	152.4	41.2	214.3	60.1	20.1	29.2	104.8
Hotels and other lodging places....	1.8	0.5	0.1	<	1.2	0.5	0.0	0.0	0.7
Personal services.................	0.4	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Business services.................	204.7	130.9	30.3	1.9	41.5	22.5	5.1	0.0	14.0
Auto repair, services, and parking.	0.7	0.5	<	0.0	0.1	0.0	0.0	0.0	0.1
Misc. repair services.............	1.3	0.2	0.3	0.1	0.8	0.0	0.0	0.0	0.8
Motion pictures...................	7.6	0.6	<	<	7.1	0.8	0.0	0.0	6.3
Amusement and recreation services..	3.0	0.5	0.0	0.1	2.3	0.8	0.0	0.0	1.5
Health services...................	3.1	1.4	0.0	1.6	0.0	0.0	0.0	0.0	0.0
Legal services....................	0.5	0.5	<	0.0	<	0.0	0.0	0.0	<
Social services...................	2.1	1.2	<	0.5	0.4	0.0	0.0	0.0	0.4
Museums, botanical, zoological gardens.........................	0.3	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Membership organizations...........	2.5	1.6	0.1	0.3	0.4	0.0	0.0	0.0	0.4
Engineering and management services	348.4	33.4	121.2	34.1	159.7	35.5	15.0	29.1	80.1
Services n.e.c....................	3.8	0.4	0.4	2.3	0.8	0.1	<	0.1	0.5

NOTE: Because of rounding, components may not add to totals.

KEY:
0 = Data were collected and the reported number or value was zero.
< = The estimated actual value is less than 50.
N.e.c. = Not elsewhere classified

SOURCE: National Science Foundation/SRS, using data from U.S. Department of Labor/Bureau of Labor Statistics, Occupational Employment Statistics Survey

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 1 of 49

Industry and occupation	Total	Pctge of total industry employment	Relative error
Iron ores (SIC 1010):			
Scientific and technical personnel	350	3.9	nc
Scientists	50	0.6	nc
Chemists	10	0.1	0
Geologists, geophysicists, and earth scientists	20	0.2	0
Computer analysts	20	0.2	nc
Managers of scientific and technical personnel	20	0.2	0
Engineers	170	1.9	nc
Industrial	10	0.1	0
Metallurgical/metallurgists	30	0.3	0
Other, n.e.c	130	1.4	nc
Technicians	110	1.2	nc
Computer programmer	50	0.6	0
Drafter	10	0.1	0
All other engineering technicians	30	0.3	nc
Chemical technicians, except health	20	0.2	0
Copper ores (SIC 1020):			
Scientific and technical personnel	1,040	6.8	nc
Scientists	220	1.4	nc
Chemists	80	0.5	1
Geologists, geophysicists, and earth scientists	110	0.7	8
All other physical scientists	10	0.1	nc
Computer analysts	20	0.1	5
Managers of scientific and technical personnel	60	0.4	2
Engineers	370	2.4	nc
Metallurgical/metallurgists	90	0.6	3
Other, n.e.c	280	1.9	nc
Technicians	390	2.6	nc
Computer programmer	20	0.1	6
Drafter	30	0.2	3
Surveyor	20	0.1	0
All other engineering technicians	170	1.1	nc
Chemical technicians, except health	110	0.7	2
All other physical and life science technicians	40	0.3	nc
Lead and zinc ores (SIC 1030):			
Scientific and technical personnel	150	5.6	nc
Scientists	50	1.9	nc
Geologists, geophysicists, and earth scientists	30	1.1	0

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 2 of 49

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Lead and zinc ores (SIC 1030)--Continued:			
All other physical scientists	10	0.4	nc
Computer analysts	10	0.4	nc
Managers of scientific and technical personnel	10	0.4	0
Engineers	50	1.9	nc
Metallurgical/metallurgists	10	0.4	0
Other, n.e.c	40	1.5	nc
Technicians	40	1.5	nc
Surveyor	10	0.4	0
All other engineering technicians	10	0.4	nc
Chemical technicians, except health	20	0.8	0
Gold and silver ores (SIC 1040):			
Scientific and technical personnel	2,980	13.4	nc
Scientists	1,020	4.6	nc
Chemists	50	0.2	5
Geologists, geophysicists, and earth scientists	870	3.9	19
All other physical scientists	50	0.2	nc
Computer analysts	50	0.2	nc
Managers of scientific and technical personnel	110	0.5	5
Engineers	680	3.1	nc
Civil	10	<	3
Computer	10	<	11
Industrial	10	<	0
Mechanical	20	0.1	1
Metallurgical/metallurgists	190	0.9	5
Other, n.e.c	440	2.0	nc
Technicians	1,170	5.3	nc
Computer programmer	60	0.3	1
Drafter	90	0.4	18
Surveyor	280	1.3	nc
Civil engineering technician	40	0.2	69
All other engineering technicians	100	0.5	nc
Chemical technicians, except health	540	2.5	11
All other physical and life science technicians	60	0.3	nc
Ferroalloy ores, except vanadium (SIC 1060):			
Scientific and technical personnel	260	12.3	nc
Scientists	70	3.3	nc
Chemists	20	0.9	0
All other physical scientists	40	1.9	nc
Computer analysts	10	0.5	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Ferroalloy ores, except vanadium (SIC 1060)--Continued:			
Managers of scientific and technical personnel	10	0.5	0
Engineers	100	4.7	nc
Metallurgical/metallurgists	40	1.9	0
Other, n.e.c	60	2.8	nc
Technicians	80	3.6	nc
All other engineering technicians	60	2.8	nc
Chemical technicians, except health	20	0.9	0
Metal mining services (SIC 1080):			
Scientific and technical personnel	1,130	22.1	nc
Scientists	750	14.7	nc
Geologists, geophysicists, and earth scientists	720	14.1	8
All other physical scientists	10	0.2	nc
Computer analysts	20	0.4	nc
Managers of scientific and technical personnel	30	0.6	4
Engineers	140	2.7	nc
Metallurgical/metallurgists	30	0.6	11
Other, n.e.c	110	2.1	nc
Technicians	210	4.1	nc
Drafter	80	1.6	6
Surveyor	50	1.0	nc
All other engineering technicians	20	0.4	nc
Chemical technicians, except health	30	0.6	20
All other physical and life science technicians	30	0.6	nc
Misc. metal ores, n.e.c. (SIC 1090):			
Scientific and technical personnel	560	15.5	nc
Scientists	180	5.0	nc
Chemists	30	0.8	0
Geologists, geophysicists, and earth scientists	130	3.6	30
All other life scientists	10	0.3	nc
Computer analysts	10	0.3	nc
Managers of scientific and technical personnel	20	0.6	17
Engineers	80	2.2	nc
Metallurgical/metallurgists	20	0.6	34
Other, n.e.c	60	1.7	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 4 of 49

Industry and occupation	Total	Pctge of total industry employment	Relative error
Misc. metal ores, n.e.c. (SIC 1090)--Continued:			
Technicians	280	7.8	nc
Drafter	50	1.4	49
Surveyor	10	0.3	0
All other engineering technicians	40	1.1	nc
Chemical technicians, except health	100	2.8	13
All other physical and life science technicians	80	2.2	nc
Bituminous coal and lignite mining (SIC 1220):			
Scientific and technical personnel	4,800	3.4	nc
Scientists	630	0.4	nc
Chemists	160	0.1	9
Geologists, geophysicists, and earth scientists	160	0.1	7
All other physical scientists	100	0.1	nc
Foresters and conservation scientists	70	0.1	4
Computer analysts	140	0.1	nc
Managers of scientific and technical personnel	380	0.3	5
Engineers	1,780	1.3	nc
Civil	80	0.1	9
Computer	40	<	80
Industrial	50	<	3
Mechanical	80	0.1	0
Metallurgical/metallurgists	30	<	35
Other, n.e.c	1,500	1.1	nc
Technicians	2,010	1.4	nc
Computer programmer	160	0.1	6
Drafter	300	0.2	9
Surveyor	860	0.6	nc
Civil engineering technician	60	<	14
All other engineering technicians	230	0.2	nc
Chemical technicians, except health	210	0.1	11
All other physical and life science technicians	190	0.1	nc
Anthracite mining (SIC 1230):			
Scientific and technical personnel	20	1.4	nc
Engineers	20	1.4	nc
Other, n.e.c	20	1.4	40
Coal mining services (SIC 1240):			
Scientific and technical personnel	310	3.9	nc
Scientists	40	0.5	nc
Chemists	10	0.1	38
Geologists, geophysicists, and earth scientists	10	0.1	0

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employment	Relative error
Coal mining services (SIC 1240)--Continued:			
All other physical scientists	10	0.1	nc
Computer analysts	10	0.1	nc
Managers of scientific and technical personnel	20	0.2	0
Engineers	110	1.4	nc
Other, n.e.c	110	1.4	nc
Technicians	140	1.8	nc
Drafter	40	0.5	0
Surveyor	50	0.6	nc
All other engineering technicians	10	0.1	nc
All other physical and life science technicians	40	0.5	nc
Crude petroleum and natural gas (SIC 1310):			
Scientific and technical personnel	47,500	24.2	nc
Scientists	14,510	7.4	nc
Operations and systems researchers and analysts	140	0.1	0
Chemists	240	0.1	6
Geologists, geophysicists, and earth scientists	10,150	5.2	5
All other physical scientists	380	0.2	nc
Life scientists	60	<	0
Economists	330	0.2	16
All other social scientists	30	<	nc
Computer analysts	3,180	1.6	nc
Managers of scientific and technical personnel	2,000	1.0	8
Engineers	15,180	7.8	nc
Chemical	640	0.3	2
Civil	790	0.4	2
Computer	230	0.1	20
Electrical/electronics	450	0.2	6
Industrial	540	0.3	1
Marine	10	0.0	0
Mechanical	910	0.5	6
Safety	410	0.2	3
Sales	100	0.1	11
Other, n.e.c	11,100	5.7	nc
Technicians	15,810	8.1	nc
Computer programmer	2,120	1.1	5
Drafter	1,820	0.9	4
Surveyor	1,110	0.6	nc
Electrical/electronics engineering technician	790	0.4	30
Mechanical engineering technicians	370	0.2	36

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Crude petroleum and natural gas (SIC 1310)--Continued:			
Civil engineering technician	390	0.2	4
All other engineering technicians	3,260	1.7	nc
Chemical technicians, except health	150	0.1	2
All other physical and life science technicians	5,800	3.0	nc
Natural gas liquids (SIC 1320):			
Scientific and technical personnel	910	20.2	nc
Scientists	340	7.5	nc
Geologists, geophysicists, and earth scientists	210	4.7	0
Computer analysts	130	2.9	nc
Managers of scientific and technical personnel	80	1.8	0
Engineers	300	6.7	nc
Other, n.e.c	300	6.7	nc
Technicians	190	4.2	nc
Computer programmer	10	0.2	0
Drafter	20	0.4	0
All other engineering technicians	20	0.4	nc
Chemical technicians, except health	10	0.2	4
All other physical and life science technicians	130	2.9	nc
Oil and gas field services (SIC 1380):			
Scientific and technical personnel	14,980	7.7	nc
Scientists	2,600	1.3	nc
Operations and systems researchers and analysts	10	0.0	0
Chemists	220	0.1	22
Geologists, geophysicists, and earth scientists	1,900	1.0	16
All other physical scientists	40	<	nc
Economists	20	<	32
Computer analysts	410	0.2	nc
Managers of scientific and technical personnel	860	0.4	12
Engineers	6,420	3.3	nc
Chemical	310	0.2	7
Civil	180	0.1	7
Computer	160	0.1	3
Electrical/electronics	360	0.2	5
Industrial	140	0.1	38
Marine	30	<	26
Mechanical	580	0.3	8
Safety	120	0.1	11

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employment	Relative error
Oil and gas field services (SIC 1380)--Continued:			
Sales	1,610	0.8	30
Other, n.e.c	2,930	1.5	nc
Technicians	5,100	2.6	nc
Computer programmer	560	0.3	14
Drafter	440	0.2	19
Surveyor	300	0.1	nc
Electrical/electronics engineering technician	860	0.4	11
Mechanical engineering technicians	300	0.1	5
Civil engineering technician	10	0.0	0
All other engineering technicians	700	0.4	nc
Chemical technicians, except health	150	0.1	46
All other physical and life science technicians	1,780	0.9	nc
Dimension stone (SIC 1410):			
Scientific and technical personnel	40	1.0	nc
Engineers	10	0.2	nc
Other, n.e.c	10	0.2	nc
Technicians	30	0.7	nc
Drafter	20	0.5	6
All other physical and life science technicians	10	0.2	nc
Crushed and broken stone (SIC 1420):			
Scientific and technical personnel	760	1.7	nc
Scientists	140	0.3	nc
Chemists	20	<	0
Geologists, geophysicists, and earth scientists	70	0.2	17
All other physical scientists	10	<	nc
Computer analysts	40	0.1	nc
Managers of scientific and technical personnel	80	0.2	0
Engineers	260	0.6	nc
Civil	10	<	0
Computer	10	<	0
Industrial	30	0.1	0
Mechanical	10	<	6
Metallurgical/metallurgists	20	<	32
Other, n.e.c	180	0.4	nc
Technicians	280	0.6	nc
Computer programmer	40	0.1	6
Drafter	20	<	27
Surveyor	30	0.1	nc
Civil engineering technician	10	<	0
All other engineering technicians	20	<	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 8 of 49

Industry and occupation	Total	Pctge of total industry employment	Relative error
Crushed and broken stone (SIC 1420)--Continued:			
Chemical technicians, except health	160	0.4	5
Sand and gravel (SIC 1440):			
Scientific and technical personnel	480	1.2	nc
Scientists	70	0.2	nc
Chemists	10	<	0
Geologists, geophysicists, and earth scientists	40	0.1	31
Computer analysts	20	0.1	0
Managers of scientific and technical personnel	60	0.2	4
Engineers	170	0.4	nc
Civil	20	0.1	0
Mechanical	10	<	0
Metallurgical/metallurgists	10	<	23
Other, n.e.c	130	0.3	nc
Technicians	180	0.5	nc
Computer programmer	40	0.1	2
Drafter	30	0.1	0
Surveyor	10	<	0
All other engineering technicians	40	0.1	nc
Chemical technicians, except health	60	0.2	16
Clay, ceramic, and refractory minerals (SIC 1450):			
Scientific and technical personnel	770	8.9	nc
Scientists	90	1.0	nc
Chemists	40	0.5	0
Geologists, geophysicists, and earth scientists	20	0.2	0
All other physical scientists	10	0.1	nc
Computer analysts	20	0.2	nc
Managers of scientific and technical personnel	40	0.5	0
Engineers	140	1.6	nc
Industrial	30	0.3	0
Mechanical	30	0.3	0
Metallurgical/metallurgists	20	0.2	0
Other, n.e.c	60	0.7	nc
Technicians	500	5.8	nc
Computer programmer	20	0.2	0
Drafter	10	0.1	0
Surveyor	30	0.3	nc
All other engineering technicians	20	0.2	nc
Chemical technicians, except health	400	4.7	0

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 9 of 49

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Clay, ceramic, and refractory minerals (SIC 1450)--Continued:			
All other physical and life science technicians	20	0.2	nc
Chemical and fertilizer minerals (SIC 1470):			
Scientific and technical personnel	1,060	6.4	nc
Scientists	140	0.8	nc
Chemists	80	0.5	0
Geologists, geophysicists, and earth scientists	30	0.2	0
All other physical scientists	10	0.1	nc
Computer analysts	20	0.1	nc
Managers of scientific and technical personnel	60	0.4	1
Engineers	350	2.1	nc
Civil	10	0.1	0
Industrial	40	0.2	0
Mechanical	60	0.4	0
Metallurgical/metallurgists	40	0.2	0
Other, n.e.c	200	1.2	nc
Technicians	510	3.1	nc
Computer programmer	10	0.1	0
Drafter	40	0.2	0
Surveyor	70	0.4	nc
Civil engineering technician	10	0.1	0
All other engineering technicians	130	0.8	nc
Chemical technicians, except health	190	1.1	0
All other physical and life science technicians	60	0.4	nc
Nonmetallic minerals services (SIC 1480):			
Scientific and technical personnel	100	8.7	nc
Scientists	70	6.1	7
Geologists, geophysicists, and earth scientists	70	6.1	7
Engineers	10	0.9	nc
Other, n.e.c	10	0.9	nc
Technicians	20	1.7	nc
Drafter	10	0.9	0
All other physical and life science technicians	10	0.9	nc
Misc. nonmetallic minerals (SIC 1490):			
Scientific and technical personnel	180	3.1	nc
Scientists	30	0.5	nc
Chemists	10	0.2	0

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Misc. nonmetallic minerals (SIC 1490):			
All other physical scientists	20	0.3	nc
Managers of scientific and technical personnel	10	0.2	0
Engineers	70	1.1	nc
Industrial	10	0.2	0
Mechanical	10	0.2	0
Metallurgical/metallurgists	10	0.2	0
Other, n.e.c	40	0.7	nc
Technicians	80	1.3	nc
Drafter	10	0.2	0
Surveyor	10	0.2	0
All other engineering technicians	10	0.2	nc
Chemical technicians, except health	50	0.8	3
Residential building construction (SIC 1520):			
Scientific and technical personnel	4,320	0.6	nc
Scientists	120	<	nc
Computer analysts	120	<	nc
Managers of scientific and technical personnel	300	<	38
Engineers	1,000	0.1	nc
Civil	720	0.1	14
Computer	30	0.0	61
Electrical/electronics	20	0.0	62
Mechanical	60	0.0	25
Safety	40	0.0	49
Sales	40	0.0	47
Other, n.e.c	90	<	nc
Technicians	2,900	0.4	nc
Computer programmer	80	<	23
Drafter	2,430	0.4	10
Surveyor	130	<	nc
Civil engineering technician	240	<	24
All other engineering technicians	20	0.0	nc
Operative builders (SIC 1530):			
Scientific and technical personnel	620	1.5	nc
Scientists	30	0.1	nc
Computer analysts	30	0.1	nc
Managers of scientific and technical personnel	50	0.1	3
Engineers	230	0.6	nc
Civil	140	0.3	19
Computer	10	<	0

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 11 of 49

Industry and occupation	Total	Pctge of total industry employment	Relative error
Operative builders (SIC 1530)--Continued:			
Other, n.e.c.	80	0.2	nc
Technicians	310	0.8	nc
Computer programmer	50	0.1	3
Drafter	210	0.5	6
Surveyor	40	0.1	nc
Civil engineering technician	10	<	0
Nonresidential building construction (SIC 1540):			
Scientific and technical personnel	17,540	2.8	nc
Scientists	430	0.1	nc
Operations and systems researchers and analysts	20	0.0	18
Physical scientists	20	0.0	0
Life scientists	10	0.0	0
Computer analysts	380	0.1	nc
Managers of scientific and technical personnel	1,700	0.3	15
Engineers	10,180	1.6	nc
Chemical	80	<	33
Civil	5,990	1.0	5
Computer	60	0.0	12
Electrical/electronics	280	<	16
Industrial	830	0.1	15
Safety	370	0.1	8
Sales	140	<	24
Other, n.e.c.	2,430	0.4	nc
Technicians	5,230	0.8	nc
Computer programmer	400	0.1	5
Drafter	2,620	0.4	9
Surveyor	520	0.1	13
Electrical/electronics engineering technician	170	<	5
Mechanical engineering technicians	300	<	1
Civil engineering technician	790	0.1	18
All other engineering technicians	410	0.1	nc
Physical and life science technicians	20	0.0	0
Highway and street construction (SIC 1610):			
Scientific and technical personnel	3,110	1.2	nc
Scientists	60	<	nc
Computer analysts	60	<	nc
Managers of scientific and technical personnel	260	0.1	3
Engineers	1,570	0.6	nc
Chemical	20	0.0	53

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employment	Relative error
Highway and street construction (SIC 1610):			
Civil	1,160	0.5	4
Computer	10	0.0	5
Industrial	60	<	7
Mechanical	80	<	19
Safety	100	<	7
Sales	50	<	3
Other, n.e.c	90	<	nc
Technicians	1,220	0.5	nc
Computer programmer	100	<	5
Drafter	110	<	3
Surveyor	640	0.2	nc
Electrical/electronics engineering technician	10	0.0	0
Civil engineering technician	200	0.1	6
All other engineering technicians	150	0.1	nc
Physical and life science technicians	10	0.0	70
Heavy construction, except highway (SIC 1620):			
Scientific and technical personnel	19,280	3.5	nc
Scientists	260	<	nc
Operations and systems researchers and analysts	10	0.0	24
Physical scientists	40	0.0	43
Life scientists	10	0.0	0
Computer analysts	200	<	nc
Managers of scientific and technical personnel	1,460	0.3	4
Engineers	11,560	2.1	nc
Chemical	640	0.1	3
Civil	4,170	0.8	8
Computer	110	<	10
Electrical/electronics	2,040	0.4	22
Industrial	440	0.1	3
Mechanical	2,140	0.4	8
Safety	520	0.1	5
Sales	130	<	28
Other, n.e.c	1,370	0.2	nc
Technicians	6,000	1.1	nc
Computer programmer	310	0.1	4
Drafter	2,260	0.4	5
Surveyor	1,070	0.2	nc
Electrical/electronics engineering technician	440	0.1	7
Mechanical engineering technicians	200	<	15
Civil engineering technician	760	0.1	8
All other engineering technicians	950	0.2	nc
Physical and life science technicians	10	0.0	0

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 13 of 49

Industry and occupation	Total	Pctge of total industry employ- ment	Relative error
Plumbing, heating, air conditioning (SIC 1710):			
Scientific and technical personnel	10,430	1.5	nc
Scientists	20	0.0	nc
Computer analysts	20	0.0	nc
Managers of scientific and technical personnel	100	<	53
Engineers	4,310	0.6	nc
Civil	50	0.0	30
Electrical/electronics	60	0.0	26
Mechanical	270	<	11
Safety	20	0.0	46
Sales	3,850	0.6	6
Other, n.e.c	60	0.0	nc
Technicians	6,000	0.9	nc
Computer programmer	50	0.0	43
Drafter	5,720	0.9	5
All other engineering technicians	230	<	nc
Electrical work (SIC 1730):			
Scientific and technical personnel	10,600	1.9	nc
Scientists	130	<	nc
Computer analysts	130	<	nc
Managers of scientific and technical personnel	280	0.1	86
Engineers	4,190	0.8	nc
Civil	40	0.0	63
Computer	10	0.0	16
Electrical/electronics	3,910	0.7	19
Safety	20	0.0	15
Sales	110	<	46
Other, n.e.c	100	<	nc
Technicians	6,000	1.1	nc
Computer programmer	140	<	22
Drafter	390	0.1	26
Electrical/electronics engineering technician	4,860	0.9	13
Civil engineering technician	130	<	55
All other engineering technicians	480	0.1	nc
Masonry, stonework, and plastering (SIC 1740):			
Scientific and technical personnel	280	<	nc
Scientists	10	0.0	nc
Computer analysts	10	0.0	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Masonry, stonework, and plastering (SIC 1740)--Continued:			
Managers of scientific and technical personnel	40	0.0	54
Engineers	30	0.0	nc
Civil	10	0.0	50
Safety	10	0.0	0
Other, n.e.c	10	0.0	nc
Technicians	200	<	nc
Drafter	150	<	28
All other engineering technicians	40	0.0	nc
Physical and life science technicians	10	0.0	0
Carpentry and floor work (SIC 1750):			
Scientific and technical personnel	230	0.1	nc
Engineers	20	0.0	nc
Other, n.e.c	20	0.0	nc
Technicians	210	0.1	nc
Drafter	210	0.1	24
Roofing, siding, and sheet-metal work (SIC 1760):			
Scientific and technical personnel	460	0.2	nc
Technicians	460	0.2	nc
Drafter	460	0.2	7
Concrete work (SIC 1770):			
Scientific and technical personnel	210	0.1	nc
Engineers	130	<	nc
Civil	80	<	32
Mechanical	40	<	0
Other, n.e.c	10	0.0	nc
Technicians	80	<	nc
Drafter	40	<	36
Surveyor	20	0.0	31
All other engineering technicians	20	0.0	nc
Water-well drilling (SIC 1780):			
Scientific and technical personnel	20	0.1	nc
Technicians	20	0.1	nc
Drafter	10	<	0
All other engineering technicians	10	<	nc
Misc. special trade contractors (SIC 1790):			
Scientific and technical personnel	5,030	0.9	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Misc. special trade contractors (SIC 1790)--Continued:			
Scientists	120	<	nc
Physical scientists	80	<	71
Computer analysts	40	0.0	nc
Managers of scientific and technical personnel	240	<	3
Engineers	620	0.1	nc
Civil	150	<	9
Industrial	10	0.0	46
Mechanical	190	<	95
Safety	70	<	7
Other, n.e.c	200	<	nc
Technicians	4,050	0.7	nc
Computer programmer	50	0.0	19
Drafter	3,530	0.7	7
Surveyor	310	0.1	nc
All other engineering technicians	150	<	nc
Physical and life science technicians	10	0.0	91
Central reserve depositories (SIC 6010):			
Scientific and technical personnel	3,090	11.6	nc
Scientists	1,970	7.4	nc
Operations and systems researchers and analysts	190	0.7	0
Statisticians	190	0.7	0
All other mathematicians	10	<	nc
Economists	390	1.5	0
All other social scientists	20	0.1	nc
Computer analysts	1,170	4.4	nc
Managers of scientific and technical personnel	450	1.7	0
Engineers	120	0.4	nc
Industrial	10	<	0
Other, n.e.c	110	0.4	nc
Technicians	550	2.1	nc
Computer programmer	550	2.1	0
Commercial banks (SIC 6020):			
Scientific and technical personnel	43,750	2.8	nc
Scientists	24,780	1.6	nc
Operations and systems researchers and analysts	3,930	0.2	2
Statisticians	180	<	15
All other mathematicians	410	<	nc
Life scientists	10	0.0	0

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Commercial banks (SIC 6020)--Continued:			
Economists	1,150	0.1	3
All other social scientists	50	0.0	nc
Computer analysts	19,050	1.2	nc
Managers of scientific and technical personnel	4,630	0.3	3
Engineers	1,930	0.1	nc
Computer	1,280	0.1	6
Electrical/electronics	220	<	0
Industrial	90	0.0	0
Other, n.e.c.	340	<	nc
Technicians	12,410	0.8	nc
Computer programmer	11,910	0.8	6
Drafter	50	0.0	0
All other engineering technicians	440	<	nc
Physical and life science technicians	10	0.0	0
Savings institutions (SIC 6030):			
Scientific and technical personnel	6,990	1.5	nc
Scientists	3,660	0.8	nc
Operations and systems researchers and analysts	520	0.1	6
Statisticians	40	0.0	9
All other mathematicians	70	<	nc
Economists	290	0.1	6
Computer analysts	2,740	0.6	nc
Managers of scientific and technical personnel	850	0.2	5
Engineers	190	<	nc
Computer	150	<	14
Industrial	10	0.0	9
Other, n.e.c.	30	0.0	nc
Technicians	2,290	0.5	nc
Computer programmer	2,230	0.5	2
Drafter	10	0.0	0
All other engineering technicians	40	0.0	nc
Physical and life science technicians	10	0.0	87
Credit unions (SIC 6060):			
Scientific and technical personnel	1,350	1.0	nc
Scientists	560	0.4	nc
Operations and systems researchers and analysts	70	0.1	12
Economists	20	<	16
Computer analysts	470	0.3	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 17 of 49

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Credit unions (SIC 6060)--Continued:			
Managers of scientific and technical personnel	270	0.2	6
Engineers	30	<	nc
Computer	20	<	14
Other, n.e.c	10	0.0	nc
Technicians	490	0.4	nc
Computer programmer	490	0.4	12
Foreign banks and branches and agencies (SIC 6080):			
Scientific and technical personnel	960	3.4	nc
Scientists	610	2.1	nc
Operations and systems researchers and analysts	80	0.3	19
Economists	120	0.4	60
Computer analysts	410	1.4	nc
Managers of scientific and technical personnel	90	0.3	12
Engineers	40	0.1	nc
Computer	20	0.1	73
Other, n.e.c	20	0.1	nc
Technicians	220	0.8	9
Computer programmer	220	0.8	9
Functions closely related to banking (SIC 6090):			
Scientific and technical personnel	2,950	5.0	nc
Scientists	1,000	1.7	nc
Operations and systems researchers and analysts	90	0.1	0
All other social scientists	20	<	nc
Computer analysts	890	1.5	nc
Managers of scientific and technical personnel	620	1.1	1
Engineers	190	0.3	nc
Computer	80	0.1	0
Other, n.e.c	110	0.2	nc
Technicians	1,140	1.9	2
Computer programmer	1,140	1.9	2
Federal and federally sponsored credit (SIC 6110):			
Scientific and technical personnel	1,110	9.9	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Federal and federally sponsored credit (SIC 6110)--Continued:			
Scientists	590	5.2	nc
Operations and systems researchers and analysts	80	0.7	0
Economists	30	0.3	0
All other social scientists	10	0.1	nc
Computer analysts	470	4.2	nc
Managers of scientific and technical personnel	160	1.4	2
Engineers	20	0.2	nc
Computer	10	0.1	0
Other, n.e.c	10	0.1	nc
Technicians	340	3.0	<
Computer programmer	340	3.0	<
Personal credit institutions (SIC 6140):			
Scientific and technical personnel	1,480	1.1	nc
Scientists	670	0.5	nc
Operations and systems researchers and analysts	160	0.1	2
Physical scientists	10	0.0	88
Economists	20	<	0
Computer analysts	480	0.4	nc
Managers of scientific and technical personnel	120	0.1	2
Engineers	10	0.0	nc
Computer	10	0.0	33
Technicians	680	0.5	nc
Computer programmer	670	0.5	4
All other engineering technicians	10	0.0	nc
Business credit institutions (SIC 6150):			
Scientific and technical personnel	2,740	3.4	nc
Scientists	1,180	1.5	nc
Operations and systems researchers and analysts	310	0.4	1
Statisticians	30	<	0
All other mathematicians	30	<	nc
Economists	110	0.1	2
Computer analysts	700	0.9	nc
Managers of scientific and technical personnel	300	0.4	2

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 19 of 49

Industry and occupation	Total	Pctge of total industry employment	Relative error
Business credit institutions (SIC 6150)--Continued:			
Engineers	240	0.3	nc
Computer	120	0.1	0
Electrical/electronics	90	0.1	0
Industrial	30	<	0
Technicians	1,020	1.3	nc
Computer programmer	1,000	1.3	2
All other engineering technicians	20	<	nc
Mortgage bankers and brokers (SIC 6160):			
Scientific and technical personnel	2,580	1.6	nc
Scientists	1,210	0.7	nc
Operations and systems researchers and analysts	60	<	8
All other mathematicians	10	0.0	nc
Economists	90	0.1	18
Computer analysts	1,050	0.7	nc
Managers of scientific and technical personnel	290	0.2	5
Engineers	60	<	nc
Computer	40	<	34
Other, n.e.c	20	<	nc
Technicians	1,020	0.6	nc
Computer programmer	990	0.6	10
All other engineering technicians	30	<	nc
Security brokers and dealers (SIC 6210):			
Scientific and technical personnel	13,860	4.2	nc
Scientists	7,300	2.2	nc
Operations and systems researchers and analysts	1,110	0.3	3
Statisticians	80	<	0
All other mathematicians	40	<	nc
Physical scientists	50	<	65
Economists	1,570	0.5	15
All other social scientists	100	<	nc
Computer analysts	4,350	1.3	nc
Managers of scientific and technical personnel	1,350	0.4	2
Engineers	310	0.1	nc
Computer	190	0.1	2
Electrical/electronics	10	0.0	9
Other, n.e.c	110	<	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 20 of 49

Industry and occupation	Total	Pctge of total industry employment	Relative error
Security brokers and dealers (SIC 6210)--Continued:			
Technicians	4,900	1.5	nc
Computer programmer	4,900	1.5	2
Commodity contracts, brokers, and dealers (SIC 6220):			
Scientific and technical personnel	620	3.6	nc
Scientists	320	1.9	nc
Economists	210	1.2	8
Computer analysts	110	0.6	10
Managers of scientific and technical personnel	60	0.3	10
Engineers	40	0.2	nc
Computer	40	0.2	65
Technicians	200	1.2	21
Computer programmer	200	1.2	21
Security and commodity exchanges (SIC 6230):			
Scientific and technical personnel	580	7.2	nc
Scientists	320	4.0	nc
Economists	170	2.1	0
Computer analysts	150	1.9	nc
Managers of scientific and technical personnel	40	0.5	0
Engineers	20	0.2	nc
Other, n.e.c	20	0.2	nc
Technicians	200	2.5	1
Computer programmer	200	2.5	1
Security and commodity services (SIC 6280):			
Scientific and technical personnel	4,170	5.5	nc
Scientists	2,460	3.2	nc
Operations and systems researchers and analysts	150	0.2	1
Statisticians	440	0.6	5
All other mathematicians	20	<	nc
Economists	320	0.4	7
Computer analysts	1,530	2.0	nc
Managers of scientific and technical personnel	300	0.4	12
Engineers	60	0.1	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Security and commodity services (SIC 6280)--Continued:			
Computer	50	0.1	5
Other, n.e.c	10	<	nc
Technicians	1,350	1.8	nc
Computer programmer	1,350	1.8	8
Life insurance (SIC 6310):			
Scientific and technical personnel	40,000	8.2	nc
Scientists	22,690	4.7	nc
Operations and systems researchers and analysts	3,030	0.6	1
Statisticians	670	0.1	3
All other mathematicians	4,400	0.9	nc
Physical scientists	30	0.0	2
Social scientists	760	0.1	1
Computer analysts	13,800	2.9	nc
Managers of scientific and technical personnel	3,050	0.6	1
Engineers	1,250	0.2	nc
Computer	730	0.1	2
Industrial	30	0.0	0
Mechanical	20	0.0	0
Safety	230	<	14
Other, n.e.c	240	<	nc
Technicians	13,010	2.7	nc
Computer programmer	12,060	2.5	1
Drafter	50	<	0
All other engineering technicians	270	0.1	nc
Physical and life science technicians	10	0.0	0
Mathematical technicians	620	0.1	2
Medical service and health insurance (SIC 6320):			
Scientific and technical personnel	17,220	7.1	nc
Scientists	10,360	4.3	nc
Operations and systems researchers and analysts	1,840	0.8	2
Statisticians	490	0.2	1
All other mathematicians	990	0.4	nc
Social scientists	190	0.1	<
Computer analysts	6,850	2.9	nc
Managers of scientific and technical personnel	1,710	0.7	1
Engineers	370	0.1	nc
Computer	170	0.1	0
Industrial	70	<	0

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employment	Relative error
Medical service and health insurance (SIC 6320)--Continued:			
Safety	70	<	29
Other, n.e.c	60	<	nc
Technicians	4,780	2.0	nc
Computer programmer	4,530	1.9	1
Drafter	10	0.0	0
All other engineering technicians	110	<	nc
Physical and life science technicians	40	<	0
Mathematical technicians	90	<	0
Fire, marine, and casualty insurance (SIC 6330):			
Scientific and technical personnel	29,740	5.3	nc
Scientists	12,770	2.3	nc
Operations and systems researchers and analysts	2,210	0.4	1
Statisticians	520	0.1	5
All other mathematicians	1,870	0.3	nc
Physical scientists	10	0.0	0
Life scientists	30	0.0	31
Social scientists	110	<	0
Computer analysts	8,020	1.4	nc
Managers of scientific and technical personnel	2,680	0.5	4
Engineers	4,460	0.8	nc
Civil	350	0.1	79
Computer	810	0.1	1
Industrial	50	0.0	20
Mechanical	40	0.0	21
Safety	2,910	0.5	10
Other, n.e.c	300	0.1	nc
Technicians	9,830	1.8	nc
Computer programmer	9,250	1.7	3
Drafter	40	0.0	7
Surveyor	20	0.0	0
All other engineering technicians	290	0.1	nc
Physical and life science technicians	20	0.0	30
Mathematical technicians	210	<	0
Surety insurance (SIC 6350):			
Scientific and technical personnel	910	6.6	nc
Scientists	440	3.2	nc
Operations and systems researchers and analysts	20	0.1	0
Statisticians	20	0.1	0
All other mathematicians	10	0.1	nc
Social scientists	50	0.4	0
Computer analysts	340	2.5	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 23 of 49

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Surety insurance (SIC 6350)--Continued:			
Managers of scientific and technical personnel	100	0.7	0
Engineers	20	0.1	nc
Other, n.e.c	20	0.1	nc
Technicians	350	2.6	7
Computer programmer	350	2.6	7
Title insurance (SIC 6360):			
Scientific and technical personnel	740	1.1	nc
Scientists	230	0.3	nc
All other mathematicians	10	<	nc
Computer analysts	220	0.3	nc
Managers of scientific and technical personnel	50	0.1	1
Engineers	10	<	nc
Computer	10	<	0
Technicians	450	0.7	nc
Computer programmer	360	0.6	8
Drafter	30	<	10
Surveyor	40	0.1	15
All other engineering technicians	20	<	nc
Pension, health, and welfare funds (SIC 6370):			
Scientific and technical personnel	1,560	4.1	nc
Scientists	820	2.2	nc
Operations and systems researchers and analysts	20	0.1	0
Statisticians	10	<	0
All other mathematicians	150	0.4	8
Social scientists	150	0.4	9
Computer analysts	490	1.3	nc
Managers of scientific and technical personnel	110	0.3	3
Engineers	10	<	nc
Other, n.e.c	10	<	nc
Technicians	620	1.6	nc
Computer programmer	610	1.6	5
All other engineering technicians	10	<	nc
Insurance carriers, n.e.c. (SIC 6390):			
Scientific and technical personnel	70	3.9	nc
Scientists	20	1.1	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 24 of 49

Industry and occupation	Total	Pctge of total industry employment	Relative error
Insurance carriers, n.e.c. (SIC 6390)--Continued:			
Computer analysts	20	1.1	nc
Managers of scientific and technical personnel	10	0.6	0
Technicians	40	2.2	6
Computer programmer	40	2.2	6
Insurance agents, brokers, and service (SIC 6410):			
Scientific and technical personnel	14,560	2.1	nc
Scientists	6,580	1.0	nc
Operations and systems researchers and analysts	570	0.1	20
Statisticians	220	<	9
All other mathematicians	1,710	0.2	nc
Social scientists	230	<	27
Computer analysts	3,850	0.6	nc
Managers of scientific and technical personnel	940	0.1	5
Engineers	2,100	0.3	nc
Computer	300	<	16
Industrial	20	0.0	0
Safety	1,420	0.2	15
Other, n.e.c	360	0.1	nc
Technicians	4,940	0.7	nc
Computer programmer	4,500	0.7	7
Drafter	50	0.0	13
All other engineering technicians	270	<	nc
Mathematical technicians	120	<	11
Real estate operators and lessors (SIC 6510):			
Scientific and technical personnel	2,560	0.4	nc
Scientists	500	0.1	nc
Operations and systems researchers and analysts	10	0.0	3
All other mathematicians	10	0.0	nc
Physical scientists	10	0.0	42
Social scientists	80	<	16
Computer analysts	390	0.1	nc
Managers of scientific and technical personnel	410	0.1	15
Engineers	1,140	0.2	nc
Civil	60	<	11
Computer	20	0.0	32
Industrial	70	<	39

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 25 of 49

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Real estate operators and lessors (SIC 6510)--Continued:			
Mechanical	520	0.1	8
Safety	20	0.0	3
Other, n.e.c	450	0.1	nc
Technicians	510	0.1	nc
Computer programmer	220	<	11
Drafter	140	<	15
Surveyor	120	<	nc
All other engineering technicians	30	0.0	nc
Real estate agents and managers (SIC 6530):			
Scientific and technical personnel	2,830	0.4	nc
Scientists	710	0.1	nc
Operations and systems researchers and analysts	80	<	9
All other mathematicians	10	0.0	nc
Life scientists	10	0.0	81
Social scientists	130	<	14
Computer analysts	480	0.1	nc
Managers of scientific and technical personnel	380	0.1	12
Engineers	910	0.1	nc
Civil	70	<	22
Computer	70	<	57
Industrial	150	<	48
Mechanical	400	0.1	14
Safety	30	0.0	22
Other, n.e.c	190	<	nc
Technicians	830	0.1	nc
Computer programmer	490	0.1	15
Drafter	170	<	12
Surveyor	130	<	nc
All other engineering technicians	40	0.0	nc
Title abstract offices (SIC 6540):			
Scientific and technical personnel	170	0.5	nc
Scientists	20	0.1	nc
Computer analysts	20	0.1	nc
Managers of scientific and technical personnel	10	<	0
Technicians	140	0.4	nc
Computer programmer	30	0.1	0
Surveyor	100	0.3	nc
All other engineering technicians	10	<	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Subdividers and developers (SIC 6550):			
Scientific and technical personnel	1,650	1.1	nc
Scientists	200	0.1	nc
Operations and systems researchers and analysts	20	<	11
All other mathematicians	20	<	nc
Life scientists	10	0.0	19
Social scientists	40	<	9
Computer analysts	110	0.1	nc
Managers of scientific and technical personnel	230	0.1	10
Engineers	610	0.4	nc
Civil	270	0.2	27
Computer	30	<	16
Mechanical	160	0.1	7
Other, n.e.c	150	0.1	nc
Technicians	610	0.4	nc
Computer programmer	170	0.1	6
Drafter	180	0.1	17
Surveyor	180	0.1	nc
All other engineering technicians	80	0.1	nc
Holding offices (SIC 6710):			
Scientific and technical personnel	9,990	8.9	nc
Scientists	4,000	3.6	nc
Operations and systems researchers and analysts	400	0.4	1
Statisticians	50	<	0
All other mathematicians	140	0.1	nc
Physical scientists	290	0.3	2
Life scientists	50	<	3
Economists	260	0.2	2
All other social scientists	30	<	nc
Computer analysts	2,780	2.5	nc
Managers of scientific and technical personnel	860	0.8	3
Engineers	1,820	1.6	nc
Computer	260	0.2	0
Electrical/electronics	340	0.3	<
Industrial	50	<	29
Other, n.e.c	1,170	1.1	nc
Technicians	3,310	3.0	nc
Computer programmer	2,270	2.0	3
Drafter	280	0.2	<
All other engineering technicians	400	0.4	nc
Physical and life science technicians	360	0.3	1

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 27 of 49

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Investment offices (SIC 6720):			
Scientific and technical personnel	350	3.6	nc
Scientists	250	2.6	nc
All other mathematicians	10	0.1	nc
All other social scientists	10	0.1	nc
Computer analysts	230	2.4	0
Technicians	100	1.0	0
Computer programmer	100	1.0	0
Trusts (SIC 6730):			
Scientific and technical personnel	1,650	4.8	nc
Scientists	1,070	3.1	nc
Operations and systems researchers and analysts	60	0.2	1
All other mathematicians	140	0.4	nc
Physical scientists	30	0.1	15
Life scientists	90	0.3	6
All other social scientists	370	1.1	nc
Computer analysts	380	1.1	nc
Managers of scientific and technical personnel	60	0.2	4
Engineers	70	0.2	nc
Other, n.e.c	70	0.2	nc
Technicians	450	1.3	nc
Computer programmer	250	0.7	10
All other engineering technicians	60	0.2	nc
Physical and life science technicians	140	0.4	1
Misc. investing (SIC 6790):			
Scientific and technical personnel	730	2.2	nc
Scientists	370	1.1	nc
Physical scientists	140	0.4	32
Economists	30	0.1	0
Computer analysts	200	0.6	nc
Managers of scientific and technical personnel	30	0.1	0
Engineers	50	0.1	nc
Computer	10	<	0
Other, n.e.c	40	0.1	nc
Technicians	280	0.8	nc
Computer programmer	190	0.6	15
Drafter	50	0.1	26
All other engineering technicians	40	0.1	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employment	Relative error
Hotels and motels (SIC 7010):			
Scientific and technical personnel	7,710	0.4	nc
Scientists	870	<	nc
Life scientists	10	0.0	86
Computer analysts	860	<	nc
Engineers	5,070	0.3	nc
Computer	260	<	10
Electrical/electronics	730	<	7
Mechanical	2,110	0.1	8
Other, n.e.c	1,970	0.1	nc
Technicians	1,770	0.1	nc
Computer programmer	540	<	5
Drafter	50	0.0	25
Electrical/electronics engineering technician	490	<	3
All other engineering technicians	680	<	nc
Physical and life science technicians	10	0.0	0
Camps and recreational vehicle parks (SIC 7030):			
Scientific and technical personnel	30	0.1	nc
Scientists	20	<	nc
Computer analysts	20	<	nc
Engineers	10	<	nc
Other, n.e.c	10	<	nc
Laundry, cleaning, and garment services (SIC 7210):			
Scientific and technical personnel	610	0.1	nc
Scientists	70	<	nc
Computer analysts	70	<	nc
Engineers	280	0.1	3
Technicians	260	0.1	nc
Computer programmer	160	<	13
Physical and life science technicians	100	<	0
Photographic studios, portrait (SIC 7220):			
Scientific and technical personnel	30	<	nc
Scientists	10	<	nc
Computer analysts	10	<	nc
Technicians	20	<	15
Computer programmer	20	<	15
Beauty shops (SIC 7230):			
Scientific and technical personnel	20	0.0	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employment	Relative error
Beauty shops (SIC 7230)--Continued:			
Scientists	20	0.0	nc
Computer analysts	20	0.0	nc
Funeral service and crematories (SIC 7260):			
Scientific and technical personnel	20	<	nc
Scientists	10	<	nc
Computer analysts	10	<	nc
Technicians	10	<	0
Computer programmer	10	<	0
Misc. personal services (SIC 7290):			
Scientific and technical personnel	250	0.2	nc
Scientists	150	0.1	nc
All other mathematicians	10	0.0	0
Computer analysts	140	0.1	nc
Technicians	100	0.1	3
Computer programmer	100	0.1	3
Advertising (SIC 7310):			
Scientific and technical personnel	3,330	1.3	nc
Scientists	2,030	0.8	nc
Operations and systems researchers and analysts	220	0.1	10
Economists	790	0.3	9
All other social scientists	10	0.0	nc
Computer analysts	1,010	0.4	nc
Managers of scientific and technical personnel	570	0.2	29
Engineers	130	<	nc
Computer	40	<	0
Electrical/electronics	70	<	46
Other, n.e.c	20	0.0	nc
Technicians	600	0.2	nc
Computer programmer	440	0.2	7
Drafter	80	<	41
Electrical/electronics engineering technician	70	<	82
All other engineering technicians	10	0.0	nc
Credit reporting and collection (SIC 7320):			
Scientific and technical personnel	2,970	2.7	nc
Scientists	800	0.7	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Credit reporting and collection (SIC 7320)--Continued:			
Operations and systems researchers and analysts	80	0.1	1
All other mathematicians	20	<	0
All other social scientists	20	<	nc
Computer analysts	680	0.6	nc
Managers of scientific and technical personnel	380	0.3	1
Engineers	310	0.3	nc
Computer	260	0.2	14
Other, n.e.c.	50	<	nc
Technicians	1,480	1.4	nc
Computer programmer	1,470	1.4	4
All other engineering technicians	10	0.0	nc
Mailing, reproduction, and stenographic (SIC 7330):			
Scientific and technical personnel	4,250	1.7	nc
Scientists	580	0.2	nc
Operations and systems researchers and analysts	150	0.1	28
All other physical scientists	20	0.0	nc
Economists	60	<	27
Computer analysts	350	0.1	nc
Managers of scientific and technical personnel	180	0.1	2
Engineers	200	0.1	nc
Computer	70	<	1
Electrical/electronics	10	0.0	19
Industrial	40	<	6
Mechanical	60	<	4
Other, n.e.c.	20	0.0	nc
Technicians	3,290	1.4	nc
Computer programmer	1,720	0.7	6
Drafter	1,390	0.6	51
Surveyor	70	<	32
Mechanical engineering technicians	10	0.0	14
All other engineering technicians	100	<	nc
Services to buildings (SIC 7340):			
Scientific and technical personnel	1,630	0.1	nc
Scientists	100	0.0	nc
Life scientists	20	0.0	74
All other social scientists	10	0.0	nc
Computer analysts	70	0.0	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 31 of 49

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Services to buildings (SIC 7340)--Continued:			
Managers of scientific and technical personnel	80	0.0	17
Engineers	650	0.1	nc
Electrical/electronics	340	<	91
Industrial	70	0.0	1
Mechanical	140	<	13
Other, n.e.c	100	<	nc
Technicians	800	0.1	nc
Computer programmer	130	<	6
Drafter	20	0.0	0
Electrical/electronics engineering technician	340	<	4
Mechanical engineering technicians	170	<	0
All other engineering technicians	120	<	nc
Physical and life science technicians	20	0.0	0
Misc. equipment rental and leasing (SIC 7350): Scientific and technical personnel	3,090	1.3	nc
Scientists	300	0.1	nc
Operations and systems researchers and analysts	10	0.0	7
Chemists	10	0.0	50
Geologists, geophysicists, and earth scientists	50	<	84
Economists	20	0.0	6
All other social scientists	10	0.0	nc
Computer analysts	200	0.1	nc
Managers of scientific and technical personnel	270	0.1	15
Engineers	940	0.4	nc
Computer	50	<	2
Electrical/electronics	80	<	25
Industrial	20	0.0	7
Mechanical	450	0.2	16
Sales	160	0.1	0
Other, n.e.c	180	0.1	nc
Technicians	1,580	0.7	nc
Computer programmer	640	0.3	8
Drafter	220	0.1	16
Electrical/electronics engineering technician	540	0.2	9
All other engineering technicians	160	0.1	nc
Physical and life science technicians	20	0.0	84
Personnel supply services (SIC 7360): Scientific and technical personnel	65,910	4.0	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 32 of 49

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Personnel supply services (SIC 7360)--Continued:			
Scientists	4,530	0.2	nc
Operations and systems researchers and analysts	210	<	39
All other mathematicians	40	0.0	0
Chemists	620	<	22
Geologists, geophysicists, and earth scientists	510	<	49
All other physical scientists	100	0.0	nc
Life scientists	140	0.0	41
Economists	330	<	87
All other social scientists	70	0.0	nc
Computer analysts	2,510	0.1	nc
Managers of scientific and technical personnel	1,030	0.1	18
Engineers	23,050	1.4	nc
Aeronautical	2,120	0.1	41
Computer	1,190	0.1	17
Electrical/electronics	1,720	0.1	12
Industrial	790	<	10
Mechanical	3,730	0.2	14
Sales	70	0.0	30
Other, n.e.c	13,430	0.8	nc
Technicians	37,300	2.3	nc
Computer programmer	5,480	0.3	24
Drafter	14,200	0.9	13
Surveyor	480	<	29
Electrical/electronics engineering technician	5,680	0.3	19
Mechanical engineering technicians	3,540	0.2	42
All other engineering technicians	6,570	0.4	nc
Physical and life science technicians	1,350	0.1	20
Computer and data processing services (SIC 7370):			
Scientific and technical personnel	316,860	39.4	nc
Scientists	91,740	11.4	nc
Operations and systems researchers and analysts	6,860	0.8	7
All other mathematicians	1,040	0.1	16
Chemists	60	0.0	13
Geologists, geophysicists, and earth scientists	740	0.1	70
Atmospheric and space scientists	280	<	23
All other physical scientists	20	0.0	nc
Life scientists	30	0.0	0
Economists	1,640	0.2	47
All other social scientists	180	<	nc
Computer analysts	80,890	10.1	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Computer and data processing services (SIC 7370)--Continued:			
Managers of scientific and technical personnel	22,330	2.8	4
Engineers	64,220	8.0	nc
Aeronautical	300	<	26
Computer	40,220	5.0	4
Electrical/electronics	14,690	1.8	6
Industrial	670	0.1	15
Mechanical	1,610	0.2	17
Sales	4,620	0.6	10
Other, n.e.c	2,110	0.3	nc
Technicians	138,570	17.3	nc
Computer programmer	117,360	14.7	3
Drafter	1,800	0.2	22
Surveyor	130	<	19
Electrical/electronics engineering technician	14,480	1.8	14
Mechanical engineering technicians	1,040	0.1	28
All other engineering technicians	3,700	0.5	nc
Physical and life science technicians	60	0.0	66
Misc. business services (SIC 7380):			
Scientific and technical personnel	29,150	2.2	nc
Scientists	2,880	0.2	nc
Operations and systems researchers and analysts	570	<	31
All other mathematicians	10	0.0	51
Chemists	250	<	22
Geologists, geophysicists, and earth scientists	80	0.0	21
All other physical scientists	290	<	nc
Life scientists	30	0.0	42
Economists	240	<	12
All other social scientists	130	<	nc
Computer analysts	1,280	0.1	nc
Managers of scientific and technical personnel	1,370	0.1	15
Engineers	3,810	0.3	nc
Computer	310	<	18
Electrical/electronics	860	0.1	28
Industrial	350	<	10
Mechanical	1,190	0.1	11
Sales	430	<	20
Other, n.e.c	670	0.1	nc
Technicians	21,090	1.6	nc
Computer programmer	3,720	0.3	11
Drafter	12,600	1.0	12

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employment	Relative error
Misc. business services (SIC 7380)--Continued:			
Surveyor	1,600	0.1	35
Electrical/electronics engineering technician	1,310	0.1	17
Mechanical engineering technicians	300	<	11
All other engineering technicians	1,080	0.1	nc
Physical and life science technicians	480	<	28
Automobile rentals, no drivers (SIC 7510):			
Scientific and technical personnel	880	0.5	nc
Scientists	190	0.1	nc
Computer analysts	190	0.1	nc
Managers of scientific and technical personnel	120	0.1	11
Engineers	30	<	7
Technicians	540	0.3	nc
Computer programmer	470	0.3	2
All other engineering technicians	70	<	nc
Automobile parking (SIC 7520):			
Scientific and technical personnel	40	0.1	nc
Scientists	20	<	0
Computer analysts	20	<	0
Technicians	20	<	nc
Computer programmer	10	<	0
Drafter	10	<	0
Automobile repair shops (SIC 7530):			
Scientific and technical personnel	230	<	nc
Scientists	40	0.0	nc
Computer analysts	40	0.0	nc
Managers of scientific and technical personnel	20	0.0	24
Engineers	60	<	13
Technicians	110	<	nc
Computer programmer	30	0.0	21
Drafter	20	0.0	12
All other engineering technicians	60	<	nc
Automobile services, except repair (SIC 7540):			
Scientific and technical personnel	120	0.1	nc
Scientists	10	0.0	nc
Computer analysts	10	0.0	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 35 of 49

Industry and occupation	Total	Pctge of total industry employment	Relative error
Automobile services, except repair (SIC 7540):			
Managers of scientific and technical personnel	20	<	21
Engineers	50	<	52
Technicians	40	<	nc
Computer programmer	20	<	6
All other engineering technicians	20	<	nc
Electrical repair shops (SIC 7620):			
Scientific and technical personnel	1,910	1.6	nc
Scientists	50	<	nc
Computer analysts	50	<	nc
Managers of scientific and technical personnel	90	0.1	16
Engineers	1,160	1.0	8
Technicians	610	0.5	nc
Computer programmer	120	0.1	13
Drafter	70	0.1	5
All other engineering technicians	410	0.4	nc
Physical and life science technicians	10	0.0	20
Misc. repair shops (SIC 7690):			
Scientific and technical personnel	1,580	0.6	nc
Scientists	130	<	nc
Physical scientists	30	<	31
Life scientists	10	0.0	0
Computer analysts	90	<	nc
Managers of scientific and technical personnel	200	0.1	2
Engineers	560	0.2	8
Technicians	690	0.2	nc
Computer programmer	90	<	5
Drafter	220	0.1	8
All other engineering technicians	340	0.1	nc
Physical and life science technicians	40	<	7
Motion picture production and services (SIC 7810):			
Scientific and technical personnel	9,430	6.3	nc
Scientists	1,130	0.7	nc
Computer analysts	1,130	0.7	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Motion picture production and services (SIC 7810)--Continued:			
Engineers	1,120	0.7	nc
Electrical/electronics	780	0.5	11
Other, n.e.c	340	0.2	nc
Technicians	7,180	4.8	nc
Computer programmer	450	0.3	6
Electrical/electronics engineering technician	690	0.5	11
All other engineering technicians	6,030	4.0	nc
Physical and life science technicians	10	0.0	53
Motion picture distribution and services (SIC 7820):			
Scientific and technical personnel	410	2.8	nc
Scientists	90	0.6	nc
Computer analysts	90	0.6	nc
Engineers	60	0.4	nc
Electrical/electronics	60	0.4	35
Technicians	260	1.8	nc
Computer programmer	50	0.3	18
Electrical/electronics engineering technician	70	0.5	15
All other engineering technicians	140	0.9	nc
Motion picture theaters (SIC 7830):			
Scientific and technical personnel	90	<	nc
Scientists	20	0.0	nc
Computer analysts	20	0.0	nc
Engineers	30	<	nc
Electrical/electronics	20	<	0
Other, n.e.c	10	0.0	nc
Technicians	40	<	nc
Computer programmer	30	<	60
Electrical/electronics engineering technician	10	0.0	27
Video tape rental (SIC 7840):			
Scientific and technical personnel	130	0.1	nc
Scientists	10	0.0	nc
Computer analysts	10	0.0	nc
Engineers	10	0.0	nc
Other, n.e.c	10	0.0	nc
Technicians	110	0.1	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 37 of 49

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Video tape rental (SIC 7840)--Continued:			
Computer programmer	20	<	0
Electrical/electronics engineering technician	30	<	35
All other engineering technicians	60	<	nc
Dance studios, schools, and halls (SIC 7910):			
Scientific and technical personnel	10	<	nc
Scientists	10	<	nc
Computer analysts	10	<	nc
Producers, orchestras, and entertainers (SIC 7920):			
Scientific and technical personnel	1,210	0.8	nc
Scientists	90	0.1	nc
Computer analysts	90	0.1	nc
Engineers	110	0.1	nc
Electrical/electronics	90	0.1	15
Other, n.e.c	20	<	nc
Technicians	1,010	0.7	nc
Computer programmer	100	0.1	23
Electrical/electronics engineering technician	310	0.2	26
All other engineering technicians	600	0.4	nc
Bowling centers (SIC 7930):			
Scientific and technical personnel	30	<	nc
Scientists	10	<	nc
Computer analysts	10	<	nc
Technicians	20	<	14
Computer programmer	20	<	14
Commercial sports (SIC 7940):			
Scientific and technical personnel	720	0.6	nc
Scientists	60	<	nc
Life scientists	10	0.0	0
Computer analysts	50	<	nc
Engineers	50	<	nc
Electrical/electronics	20	<	9
Other, n.e.c	30	<	nc
Technicians	610	0.6	nc
Computer programmer	60	0.1	7
All other engineering technicians	550	0.5	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 38 of 49

Industry and occupation	Total	Pctge of total industry employment	Relative error
Misc. amusement, recreation services (SIC 7990):			
Scientific and technical personnel	2,000	0.2	nc
Scientists	350	<	nc
Life scientists	40	0.0	3
Computer analysts	310	<	nc
Engineers	370	<	nc
Electrical/electronics	190	<	3
Other, n.e.c	180	<	nc
Technicians	1,280	0.1	nc
Computer programmer	360	<	3
Electrical/electronics engineering technician	480	0.1	21
All other engineering technicians	360	<	nc
Physical and life science technicians	80	<	34
Offices and clinics of medical doctors (SIC 8010):			
Scientific and technical personnel	6,050	0.4	nc
Scientists	4,640	0.3	nc
All other mathematicians	40	0.0	0
Physical scientists	70	0.0	19
Biological scientists	460	<	54
Medical scientists	280	<	16
All other life scientists	520	<	nc
Psychologists	2,500	0.2	20
All other social scientists	100	0.0	nc
Computer analysts	670	<	nc
Managers of scientific and technical personnel	370	<	10
Engineers	70	0.0	10
Technicians	970	0.1	nc
Computer programmer	370	<	6
Physical and life science technicians	600	<	20
Offices and clinics of dentists (SIC 8020):			
Scientific and technical personnel	110	0.0	nc
Scientists	30	0.0	nc
All other life scientists	20	0.0	nc
Computer analysts	10	0.0	nc
Managers of scientific and technical personnel	50	0.0	58
Technicians	30	0.0	nc
Computer programmer	10	0.0	0
Physical and life science technicians	20	0.0	0

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Offices of osteopathic physicians (SIC 8030):			
Scientific and technical personnel	40	0.1	nc
Scientists	40	0.1	nc
Psychologists	40	0.1	45
Offices of other health practitioners (SIC 8040):			
Scientific and technical personnel	4,380	1.6	nc
Scientists	4,260	1.6	nc
All other life scientists	50	<	nc
Psychologists	4,150	1.5	7
All other social scientists	30	<	nc
Computer analysts	30	<	18
Managers of scientific and technical personnel	70	<	34
Technicians	50	<	26
Computer programmer	50	<	26
Nursing and personal care facilities (SIC 8050):			
Scientific and technical personnel	1,330	0.1	nc
Scientists	780	<	nc
Physical scientists	10	0.0	0
Medical scientists	70	0.0	74
Psychologists	360	<	21
All other social scientists	100	0.0	nc
Computer analysts	240	<	nc
Managers of scientific and technical personnel	250	<	26
Engineers	80	0.0	49
Technicians	220	<	nc
Computer programmer	220	<	48
Medical and dental laboratories (SIC 8070):			
Scientific and technical personnel	4,130	2.4	nc
Scientists	2,500	1.5	nc
All other mathematicians	10	0.0	22
Physical scientists	500	0.3	12
Biological scientists	590	0.3	6
Medical scientists	1,000	0.6	6
All other life scientists	40	<	nc
All other social scientists	20	<	nc
Computer analysts	340	0.2	nc
Managers of scientific and technical personnel	460	0.3	5

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employment	Relative error
Medical and dental laboratories (SIC 8070)--Continued:			
Engineers	90	0.1	25
Technicians	1,080	0.6	nc
Computer programmer	320	0.2	3
Physical and life science technicians	760	0.5	3
Home health care services (SIC 8080):			
Scientific and technical personnel	310	0.1	nc
Scientists	80	<	nc
Psychologists	20	0.0	30
Computer analysts	60	<	nc
Managers of scientific and technical personnel	130	<	12
Technicians	100	<	11
Computer programmer	100	<	11
Health and allied services, n.e.c. (SIC 8090):			
Scientific and technical personnel	4,840	2.0	nc
Scientists	3,880	1.6	nc
All other mathematicians	10	0.0	32
Physical scientists	110	<	2
Biological scientists	60	<	4
Medical scientists	110	<	5
All other life scientists	20	0.0	nc
Psychologists	2,950	1.3	6
All other social scientists	160	0.1	nc
Computer analysts	460	0.2	nc
Managers of scientific and technical personnel	320	0.1	6
Engineers	20	0.0	11
Technicians	620	0.2	nc
Computer programmer	370	0.1	4
Physical and life science technicians	250	0.1	3
Legal services (SIC 8110):			
Scientific and technical personnel	1,600	0.1	nc
Scientists	800	0.1	nc
Operations and systems researchers and analysts	70	0.0	13
All other mathematicians	10	0.0	nc
Physical scientists	50	0.0	0
Social scientists	30	0.0	14
Computer analysts	640	0.1	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employment	Relative error
Legal services (SIC 8110)--Continued:			
Managers of scientific and technical personnel	260	<	13
Engineers	30	0.0	nc
Computer	30	0.0	39
Technicians	510	0.1	nc
Computer programmer	480	0.1	17
Drafter	20	0.0	26
All other engineering technicians	10	0.0	nc
Individual and family services (SIC 8320):			
Scientific and technical personnel	5,730	1.2	nc
Scientists	4,260	0.9	nc
Statisticians	320	0.1	79
All other mathematicians	10	0.0	nc
Life scientists	100	<	0
Economists	60	<	30
Psychologists	3,080	0.7	10
All other social scientists	320	0.1	nc
Computer analysts	370	0.1	nc
Managers of scientific and technical personnel	450	0.1	63
Engineers	40	0.0	30
Technicians	980	0.2	nc
Computer programmer	420	0.1	41
All other engineering technicians	120	<	nc
Physical and life science technicians	440	0.1	<
Job training and related services (SIC 8330):			
Scientific and technical personnel	1,230	0.5	nc
Scientists	730	0.3	nc
Statisticians	60	<	35
Life scientists	10	0.0	0
Economists	40	<	22
Psychologists	370	0.2	11
All other social scientists	120	0.1	nc
Computer analysts	130	0.1	nc
Managers of scientific and technical personnel	90	<	12
Engineers	60	<	9
Technicians	350	0.2	nc
Computer programmer	170	0.1	10
All other engineering technicians	180	0.1	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employment	Relative error
Child day care services (SIC 8350):			
Scientific and technical personnel	180	<	nc
Scientists	120	<	nc
Statisticians	10	0.0	61
Psychologists	70	<	14
All other social scientists	10	0.0	nc
Computer analysts	30	0.0	nc
Managers of scientific and technical personnel	20	0.0	21
Technicians	40	<	21
Computer programmer	40	<	21
Residential care (SIC 8360):			
Scientific and technical personnel	2,090	0.4	nc
Scientists	1,820	0.4	nc
Statisticians	20	0.0	0
Economists	10	0.0	15
Psychologists	1,510	0.3	8
All other social scientists	100	<	nc
Computer analysts	180	<	nc
Managers of scientific and technical personnel	90	<	16
Engineers	30	0.0	27
Technicians	150	<	nc
Computer programmer	120	<	11
All other engineering technicians	20	0.0	nc
Physical and life science technicians	10	0.0	24
Social services, n.e.c. (SIC 8390):			
Scientific and technical personnel	1,970	1.0	nc
Scientists	1,270	0.7	nc
Statisticians	90	0.1	12
All other mathematicians	20	<	nc
Physical scientists	10	0.0	35
Life scientists	80	<	61
Economists	100	0.1	13
Psychologists	400	0.2	18
All other social scientists	260	0.1	nc
Computer analysts	310	0.2	nc
Managers of scientific and technical personnel	150	0.1	4
Engineers	20	<	16
Technicians	530	0.3	nc
Computer programmer	430	0.2	8

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employment	Relative error
Social services, n.e.c. (SIC 8390)--Continued:			
Drafter	10	0.0	44
All other engineering technicians	40	<	nc
Physical and life science technicians	50	<	3
Museums and art galleries (SIC 8410):			
Scientific and technical personnel	750	1.4	nc
Scientists	410	0.8	nc
Physical scientists	90	0.2	0
Life scientists	80	0.1	24
Social scientists	140	0.3	5
Computer analysts	100	0.2	nc
Managers of scientific and technical personnel	140	0.3	5
Engineers	40	0.1	10
Technicians	160	0.3	nc
Computer programmer	80	0.1	6
Physical and life science technicians	80	0.1	0
Botanical and zoological gardens (SIC 8420):			
Scientific and technical personnel	560	3.8	nc
Scientists	300	2.0	nc
Physical scientists	10	0.1	0
Life scientists	250	1.7	10
Computer analysts	40	0.3	nc
Managers of scientific and technical personnel	90	0.6	3
Engineers	30	0.2	0
Technicians	140	0.9	nc
Computer programmer	20	0.1	6
Physical and life science technicians	120	0.8	2
Business associations (SIC 8610):			
Scientific and technical personnel	3,300	3.0	nc
Scientists	1,830	1.7	nc
Statisticians	520	0.5	1
All other mathematicians	20	<	nc
Physical scientists	80	0.1	15
Life scientists	150	0.1	9
Economists	360	0.3	13
All other social scientists	120	0.1	nc
Computer analysts	580	0.5	nc
Managers of scientific and technical personnel	370	0.3	5

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Business associations (SIC 8610)--Continued:			
Engineers	420	0.4	8
Technicians	680	0.6	nc
Computer programmer	510	0.5	4
Drafter	10	0.0	31
All other engineering technicians	90	0.1	nc
Physical and life science technicians	70	0.1	24
Professional organizations (SIC 8620):			
Scientific and technical personnel	1,730	3.3	nc
Scientists	640	1.2	nc
Statisticians	80	0.1	4
Life scientists	70	0.1	7
Economists	40	0.1	5
Psychologists	30	0.1	24
All other social scientists	20	<	nc
Computer analysts	400	0.8	nc
Managers of scientific and technical personnel	230	0.4	2
Engineers	270	0.5	3
Technicians	590	1.1	nc
Computer programmer	370	0.7	4
Drafter	90	0.2	17
All other engineering technicians	60	0.1	nc
Physical and life science technicians	70	0.1	0
Labor organizations (SIC 8630):			
Scientific and technical personnel	670	0.5	nc
Scientists	360	0.2	nc
Statisticians	30	<	5
Economists	120	0.1	8
All other social scientists	90	0.1	nc
Computer analysts	120	0.1	nc
Managers of scientific and technical personnel	40	<	1
Engineers	30	<	67
Technicians	240	0.2	nc
Computer programmer	240	0.2	2
Civic and social associations (SIC 8640):			
Scientific and technical personnel	1,780	0.3	nc
Scientists	920	0.2	nc
Statisticians	40	0.0	20

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Civic and social associations (SIC 8640)--Continued:			
All other mathematicians	30	0.0	nc
Physical scientists	50	<	5
Life scientists	130	<	5
Economists	60	<	26
Psychologists	60	<	1
All other social scientists	190	<	nc
Computer analysts	360	0.1	nc
Managers of scientific and technical personnel	160	<	11
Engineers	90	<	10
Technicians	610	0.1	nc
Computer programmer	290	0.1	6
Drafter	30	0.0	0
All other engineering technicians	200	<	nc
Physical and life science technicians	90	<	4
Political organizations (SIC 8650):			
Scientific and technical personnel	100	1.4	nc
Scientists	30	0.4	nc
Computer analysts	30	0.4	nc
Technicians	70	0.9	20
Computer programmer	70	0.9	20
Membership organizations, n.e.c. (SIC 8690):			
Scientific and technical personnel	870	1.2	nc
Scientists	420	0.6	nc
All other mathematicians	120	0.2	nc
Physical scientists	10	<	31
Life scientists	130	0.2	6
Economists	10	<	0
All other social scientists	50	0.1	nc
Computer analysts	100	0.1	nc
Managers of scientific and technical personnel	120	0.2	<
Engineers	30	<	16
Technicians	300	0.4	nc
Computer programmer	160	0.2	1
Drafter	10	<	26
All other engineering technicians	100	0.1	nc
Physical and life science technicians	30	<	14
Engineering and architectural services (SIC 8710):			
Scientific and technical personnel	468,430	57.3	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 46 of 49

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Engineering and architectural services (SIC 8710)--Continued:			
Scientists	23,370	2.8	nc
Operations and systems researchers and analysts	1,490	0.2	19
Statisticians	70	0.0	7
All other mathematicians	390	<	nc
Chemists	2,330	0.3	6
Geologists, geophysicists, and earth scientists	7,300	0.9	8
Atmospheric and space scientists	130	<	16
Physicists and astronomers	420	0.1	13
All other physical scientists	3,030	0.4	nc
Biological scientists	620	0.1	7
All other life scientists	310	<	nc
Economists	200	<	10
Urban and regional planners	1,000	0.1	12
All other social scientists	250	<	nc
Computer analysts	5,830	0.7	nc
Managers of scientific and technical personnel	28,160	3.5	3
Engineers	171,260	20.9	nc
Aeronautical	6,510	0.8	10
Agricultural	1,280	0.1	29
Chemical	5,610	0.7	5
Civil	61,890	7.6	2
Computer	7,920	1.0	8
Electrical/electronics	27,740	3.4	4
Industrial	5,090	0.6	10
Marine	2,280	0.3	18
Mechanical	31,350	3.8	5
Metallurgical/metallurgists	740	0.1	8
Safety	2,550	0.3	16
Nuclear	2,640	0.3	12
Sales	2,760	0.3	13
Other, n.e.c.	12,900	1.6	nc
Technicians	245,640	30.1	nc
Computer programmer	7,530	0.9	6
Drafter	113,500	13.9	2
Surveyor	56,290	6.9	nc
Electrical/electronics engineering technician	17,790	2.2	5
Mechanical engineering technicians	9,870	1.2	7
Civil engineering technician	25,880	3.2	5
All other engineering technicians	11,810	1.4	nc
Biological science technician	50	0.0	10
Chemical technicians, except health	1,400	0.2	30
Nuclear technicians	170	<	12
All other physical and life science technicians	1,350	0.1	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Accounting, auditing, and bookkeeping (SIC 8720):			
Scientific and technical personnel	14,860	2.6	nc
Scientists	9,500	1.7	nc
Operations and systems researchers and analysts	1,650	0.3	21
All other mathematicians	1,580	0.3	nc
All other physical scientists	40	0.0	nc
All other life scientists	40	0.0	nc
Economists	50	0.0	0
All other social scientists	20	0.0	nc
Computer analysts	6,120	1.1	nc
Managers of scientific and technical personnel	600	0.1	7
Engineers	590	0.1	nc
Civil	20	0.0	34
Computer	360	0.1	13
Electrical/electronics	50	0.0	15
Mechanical	50	0.0	12
Safety	10	0.0	0
Other, n.e.c.	100	<	nc
Technicians	4,170	0.8	nc
Computer programmer	3,980	0.7	6
Drafter	50	0.0	23
Electrical/electronics engineering technician	40	0.0	2
All other engineering technicians	100	<	nc
Research and testing services (SIC 8730):			
Scientific and technical personnel	232,440	35.7	nc
Scientists	77,530	11.9	nc
Operations and systems researchers and analysts	2,390	0.4	8
Statisticians	3,230	0.5	6
All other mathematicians	2,700	0.4	nc
Chemists	12,780	2.0	8
Geologists, geophysicists, and earth scientists	3,270	0.5	9
Atmospheric and space scientists	790	0.1	32
Physicists and astronomers	6,160	0.9	5
All other physical scientists	4,540	0.7	nc
Agricultural scientists	760	0.1	12
Biological scientists	11,640	1.8	8
Medical scientists	6,540	1.0	17
All other life scientists	2,740	0.4	nc
Economists	6,800	1.1	9
Psychologists	1,790	0.3	21
Urban and regional planners	290	<	28
All other social scientists	3,730	0.6	nc
Computer analysts	7,380	1.1	nc

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Page 48 of 49

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Research and testing services (SIC 8730):			
Managers of scientific and technical personnel	18,310	2.8	3
Engineers	66,230	10.2	nc
Aeronautical	7,030	1.1	11
Agricultural	100	<	14
Chemical	2,960	0.5	6
Civil	2,310	0.3	7
Computer	6,660	1.0	11
Electrical/electronics	23,980	3.7	5
Industrial	2,020	0.3	11
Marine	400	0.1	9
Mechanical	7,890	1.2	3
Metallurgical/metallurgists	2,130	0.3	7
Safety	990	0.1	5
Nuclear	3,680	0.6	2
Sales	320	<	14
Other, n.e.c	5,760	0.9	nc
Technicians	70,370	10.8	nc
Computer programmer	8,810	1.4	4
Drafter	3,110	0.5	7
Surveyor	290	<	nc
Electrical/electronics engineering technician	14,140	2.2	3
Mechanical engineering technicians	4,560	0.7	6
Civil engineering technician	2,360	0.4	13
All other engineering technicians	8,210	1.3	nc
Biological science technician	8,020	1.2	7
Chemical technicians, except health	11,960	1.8	10
Nuclear technicians	1,690	0.3	15
All other physical and life science technicians	7,220	1.1	nc
Services, n.e.c. (SIC 8990):			
Scientific and technical personnel	13,590	32.6	nc
Scientists	7,830	18.8	nc
Operations and systems researchers and analysts	160	0.4	2
Statisticians	50	0.1	8
All other mathematicians	2,720	6.5	nc
Chemists	200	0.5	5
Geologists, geophysicists, and earth scientists	2,130	5.1	3
Atmospheric and space scientists	730	1.8	18
Physicists and astronomers	80	0.2	22
All other physical scientists	670	1.6	nc
Biological scientists	130	0.3	20
All other life scientists	70	0.2	nc
Economists	10	<	0
Psychologists	220	0.5	16

See explanatory information, if any, and SOURCE at end of table.

Table A-5. Scientists, engineers, and technicians in nonmanufacturing industries as a percentage of total industry employment, and the relative error: 1990

Industry and occupation	Total	Pctge of total industry employ-ment	Relative error
Services, n.e.c. (SIC 8990)--Continued:			
All other social scientists	210	0.5	nc
Computer analysts	450	1.1	nc
Managers of scientific and technical personnel	680	1.6	4
Engineers	1,290	3.1	nc
Agricultural	10	<	0
Chemical	100	0.2	3
Civil	220	0.5	7
Computer	120	0.3	5
Electrical/electronics	80	0.2	20
Industrial	30	0.1	9
Mechanical	40	0.1	0
Metallurgical/metallurgists	10	<	33
Safety	70	0.2	6
Nuclear	260	0.6	19
Sales	50	0.1	0
Other, n.e.c	300	0.7	nc
Technicians	3,790	9.1	nc
Computer programmer	400	1.0	3
Drafter	360	0.9	8
Surveyor	140	0.3	nc
Electrical/electronics engineering technician	50	0.1	19
Mechanical engineering technicians	40	0.1	11
Civil engineering technician	140	0.3	2
All other engineering technicians	400	1.0	nc
Biological science technician	50	0.1	42
Chemical technicians, except health	260	0.6	12
Nuclear technicians	1,070	2.6	15
All other physical and life science technicians	880	2.1	nc

NOTE: Because of rounding, components may not add to totals.

KEY:
nc = not computed
0 = Data were collected and the reported number or value was zero.
< = The estimated actual value is less than 50 for numbers and less than .05 for percentages.
N.e.c. = Not elsewhere classified

SOURCE: National Science Foundation/SRS, using data from U.S. Department of Labor/Bureau of Labor Statistics, Occupational Employment Statistics Survey

Table A-6. R&D scientific, engineering, and technical (SET) personnel and SET managers in nonmanufacturing industries, by detailed industry of employment: 1990

[Filled jobs in thousands]

Page 1 of 4

Detailed industry	Total SET personnel		SET personnel managers		Scientists		Engineers		Technicians	
	Number	Pct	Number	Pct	Number	Pct	Number	Pct	Number	Pct
Total nonmanufacturing............	119.5	100.0	9.6	100.0	36.7	100.0	39.7	100.0	33.5	100.0
Mining................................	2.3	2.0	0.1	1.2	0.8	2.2	0.7	1.7	0.7	2.2
Metal mining..........................	0.3	0.2	0.0	0.0	0.1	0.3	0.1	0.2	0.1	0.3
Iron ores...........................	<	<	0.0	0.0	0.0	0.0	<	<	<	0.1
Copper ores.........................	<	<	0.0	0.0	0.0	0.0	0.0	0.0	<	<
Gold and silver ores................	0.1	0.1	0.0	0.0	0.1	0.2	0.1	0.1	<	<
Ferroalloy ores, except vanadium.....	0.1	0.1	0.0	0.0	<	<	<	0.1	<	0.1
Metal mining services...............	<	<	0.0	0.0	<	<	0.0	0.0	0.0	0.0
Misc. metal ores, n.e.c.............	<	<	0.0	0.0	<	0.1	0.0	0.0	<	<
Coal mining...........................	<	<	0.0	0.0	0.0	0.0	0.0	0.0	<	<
Bituminous coal and lignite mining...	<	<	0.0	0.0	0.0	0.0	0.0	0.0	<	<
Oil and gas extraction................	1.9	1.6	0.1	1.2	0.7	1.8	0.6	1.5	0.6	1.7
Crude petroleum and natural gas......	1.4	1.2	<	0.4	0.6	1.6	0.4	1.0	0.4	1.3
Oil and gas field services..........	0.5	0.4	0.1	0.8	0.1	0.2	0.2	0.5	0.1	0.4
Nonmetallic minerals, except fuels.....	0.1	0.1	0.0	0.0	<	0.1	0.0	0.0	0.1	0.2
Crushed and broken stone............	<	<	0.0	0.0	0.0	0.0	0.0	0.0	<	<
Clay, ceramic, and refractory minerals.........................	0.1	0.1	0.0	0.0	<	0.1	0.0	0.0	0.1	0.1
Nonmetallic minerals services........	<	<	0.0	0.0	<	<	0.0	0.0	0.0	0.0
Construction..........................	0.7	0.6	<	0.1	<	<	0.1	0.3	0.6	1.6
General building contractors..........	0.1	0.1	0.0	0.0	<	<	<	<	0.1	0.2
Residential building construction....	<	<	0.0	0.0	0.0	0.0	0.0	0.0	<	0.1
Nonresidential building excluding building.........................	0.1	0.1	0.0	0.0	<	<	<	<	<	0.1

See explanatory information, if any, and SOURCE at end of table.

Table A-6. R&D scientific, engineering, and technical (SET) personnel and SET managers in nonmanufacturing industries, by detailed industry of employment: 1990

[Filled jobs in thousands]

Page 2 of 4

Detailed industry	Total SET personnel		SET personnel managers		Scientists		Engineers		Technicians	
	Number	Pct	Number	Pct	Number	Pct	Number	Pct	Number	Pct
Construction--Continued										
Heavy construction, excluding building	0.1	0.1	<	0.1	0.0	0.0	<	0.1	<	<
Highway and street construction	<	<	0.0	0.0	0.0	0.0	<	<	0.0	0.0
Heavy construction, except highway	0.1	<	<	0.1	0.0	0.0	<	0.1	<	<
Special trade contractors	0.6	0.5	0.0	0.0	0.0	0.0	0.1	0.2	0.5	1.4
Plumbing, heating, air conditioning	0.2	0.2	0.0	0.0	0.0	0.0	<	<	0.2	0.7
Electrical work	0.2	0.2	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.5
Roofing, siding, and sheet-metal work	<	<	0.0	0.0	0.0	0.0	0.0	0.0	<	<
Misc. special trade contractors	0.1	0.1	0.0	0.0	0.0	0.0	<	<	0.1	0.2
Services	116.4	97.5	9.5	98.6	35.9	97.7	38.9	98.0	32.2	96.2
Business services	23.8	19.9	2.4	24.4	4.3	11.8	7.3	18.3	9.8	29.3
Advertising	0.1	0.1	0.0	0.0	0.1	0.1	<	<	0.0	0.0
Credit reporting and collection	0.1	0.1	0.0	0.0	<	0.1	0.0	0.0	<	0.1
Mailing, reproduction, and stenographic	0.1	0.1	<	0.1	<	<	<	<	0.1	0.1
Misc. equipment rental and leasing	0.1	0.1	0.0	0.0	<	0.1	<	0.1	<	0.1
Personnel supply services	1.7	1.4	0.0	0.0	0.3	0.9	0.3	0.7	1.1	3.2
Computer and data processing services	21.3	17.8	2.2	23.4	3.8	10.5	6.7	16.8	8.6	25.6
Misc. business services	0.5	0.4	0.1	0.9	<	0.1	0.3	0.7	0.1	0.2
Health services	1.2	1.0	<	0.3	0.6	1.7	<	<	0.5	1.6
Offices and clinics of medical doctors	0.4	0.3	<	0.2	0.1	0.2	0.0	0.0	0.3	0.8
Offices of other health practitioners	0.1	<	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
Nursing and personal care facilities	<	<	0.0	0.0	<	<	0.0	0.0	0.0	0.0

See explanatory information, if any, and SOURCE at end of table.

Table A-6. R&D scientific, engineering, and technical (SET) personnel and SET managers in nonmanufacturing industries, by detailed industry of employment: 1990

[Filled jobs in thousands]

Page 3 of 4

Detailed industry	Total SET personnel		SET personnel managers		Scientists		Engineers		Technicians	
	Number	Pct	Number	Pct	Number	Pct	Number	Pct	Number	Pct
Services--Continued										
Medical and dental laboratories......	0.4	0.3	0.0	0.0	0.3	0.8	<	<	0.1	0.3
Health and allied services, n.e.c....	0.4	0.3	<	0.1	0.2	0.5	0.0	0.0	0.2	0.5
Social services.......................	0.2	0.2	<	0.1	0.1	0.4	<	<	<	0.1
Individual and family services.......	0.1	0.1	<	0.1	<	0.1	<	<	<	0.1
Job training and related services....	<	<	0.0	0.0	<	<	0.0	0.0	0.0	0.0
Residential care.....................	<	<	0.0	0.0	<	0.1	0.0	0.0	0.0	0.0
Social services, n.e.c...............	0.1	0.1	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0
Membership organizations..............	0.1	0.1	<	0.1	0.1	0.2	<	<	0.1	0.1
Business associations................	<	<	0.0	0.0	<	0.1	<	<	0.0	0.0
Professional organizations...........	0.1	0.1	<	0.1	<	<	0.0	0.0	<	0.1
Civic and social associations........	<	<	0.0	0.0	0.0	0.0	0.0	0.0	<	<
Membership organizations, n.e.c......	0.1	<	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
Engineering and management services....	90.8	76.0	7.1	73.5	30.6	83.3	31.5	79.4	21.7	64.8
Engineering and architectural services.........................	9.1	7.7	1.0	10.8	0.4	1.2	5.0	12.6	2.7	7.9
Accounting, auditing, and bookkeeping.......................	0.3	0.3	0.0	0.0	0.2	0.5	<	<	0.1	0.4
Research and testing services........	76.7	64.2	5.6	58.3	28.1	76.6	24.9	62.7	18.1	54.2
Management and public relations......	4.7	3.9	0.4	4.4	1.9	5.1	1.6	4.1	0.8	2.3

See explanatory information, if any, and SOURCE at end of table.

Table A-6. R&D scientific, engineering, and technical (SET) personnel and SET managers in nonmanufacturing industries, by detailed industry of employment: 1990

[Filled jobs in thousands]

Page 4 of 4

Detailed industry	Total SET personnel		SET personnel managers		Scientists		Engineers		Technicians	
	Number	Pct	Number	Pct	Number	Pct	Number	Pct	Number	Pct
Services--Continued										
Services n.e.c.	0.3	0.3	<	0.2	0.1	0.4	0.1	0.2	0.1	0.2

NOTE: Because of rounding, components may not add to totals.

KEY:
0 = Data were collected and the reported number or value was zero.
< = The estimated actual value is less than 50 for numbers, and less than 0.05 for percents.
N.e.c. = Not elsewhere classified

SOURCE: National Science Foundation/SRS, using data from U.S. Department of Labor/Bureau of Labor Statistics, Occupational Employment Statistics Survey

72

Table A-7. R&D scientists in nonmanufacturing industries, by broad industry group of employment and detailed occupation: 1990

[Filled jobs in thousands]

Page 1 of 1

Broad industry group of employment	Total	Physical	Mathematical	Life	Social	Computer
Total nonmanufacturing.........	36.7	10.2	3.6	12.4	4.0	6.4
Mining..............................	0.8	0.8	0.0	0.0	0.0	<
Metal mining......................	0.1	0.1	0.0	0.0	0.0	0.0
Oil and gas extraction............	0.7	0.7	0.0	0.0	0.0	<
Nonmetallic minerals, except fuels.	<	<	0.0	0.0	0.0	0.0
Services............................	35.9	9.4	3.6	12.4	4.0	6.4
Business services.................	4.3	0.1	0.7	0.1	0.1	3.4
Health services...................	0.6	0.2	0.0	0.3	0.1	<
Social services...................	0.1	0.0	<	<	0.1	<
Membership organizations..........	0.1	<	<	0.1	<	<
Engineering and management services	30.5	9.0	2.8	11.9	3.8	3.0
Services n.e.c....................	0.1	0.1	0.1	0.0	0.0	<

NOTE: Because of rounding, components may not add to totals.

KEY:
0 = Data were collected and the reported number or value was zero.
< = The estimated actual value is less than 50.
N.e.c. = Not elsewhere classified

SOURCE: National Science Foundation/SRS, using data from U.S. Department of Labor/Bureau of Labor Statistics, Occupational Employment Statistics Survey

Table A-8. R&D engineers in nonmanufacturing industries, by broad industry group of employment and detailed occupation: 1990

[Filled jobs in thousands]

Page 1 of 1

Broad industry group of employment	Total	Aero-nau-tical	Civil	Elec-trical/elec-tronics	Computer	Mechan-ical	Indus-trial	Sales	Other
Total nonmanufacturing	39.7	5.3	0.7	14.3	9.0	3.9	0.7	0.0	5.8
Mining	0.7	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.5
Metal mining	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Oil and gas extraction	0.6	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.4
Nonmetallic minerals, except fuels	<	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<
Construction	0.1	0.0	<	0.1	0.0	0.0	0.0	0.0	0.1
General building contractors	<	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<
Heavy construction, excluding building	0.1	0.0	<	0.0	0.0	0.0	0.0	0.0	<
Special trade contractors	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	<
Services	38.9	5.3	0.7	14.2	8.9	3.8	0.7	0.0	5.3
Business services	7.3	0.1	0.0	1.2	5.2	0.3	0.1	0.0	0.4
Health services	<	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<
Social services	<	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<
Membership organizations	<	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<
Engineering and management services	31.5	5.2	0.7	13.0	3.7	3.5	0.7	0.0	4.7
Services n.e.c.	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1

NOTE: Because of rounding, components may not add to totals.

KEY:

0 = Data were collected and the reported number or value was zero.
< = The estimated actual value is less than 50.
N.e.c. = Not elsewhere classified

SOURCE: National Science Foundation/SRS, using data from U.S. Department of Labor/Bureau of Labor Statistics, Occupational Employment Statistics Survey

Table A-9. R&D technicians in nonmanufacturing industries, by broad industry group of employment and detailed occupation: 1990

[Filled jobs in thousands]

Page 1 of 1

Broad industry group of employment	Total	Computer programmer	Drafter	Science	Engineering				
					Total	Electrical/electronics	Mechanical	Civil	Other
Total nonmanufacturing	33.5	11.3	2.6	9.2	10.4	6.1	1.8	0.2	2.3
Mining	0.8	<	<	0.4	0.3	0.1	<	0.0	0.2
Metal mining	0.1	0.0	0.0	<	0.1	0.0	0.0	0.0	0.1
Coal mining	<	0.0	0.0	0.0	<	0.0	0.0	0.0	<
Oil and gas extraction	0.6	<	<	0.3	0.2	0.1	<	0.0	0.1
Nonmetallic minerals, except fuels	0.1	0.0	0.0	0.1	<	0.0	0.0	0.0	<
Construction	0.6	<	0.3	0.0	0.2	0.2	0.0	0.0	<
General building contractors	0.1	<	<	0.0	<	0.0	0.0	0.0	<
Heavy construction, excluding building	<	0.0	0.0	0.0	<	0.0	0.0	0.0	<
Special trade contractors	0.5	0.0	0.3	0.0	0.2	0.2	0.0	0.0	0.0
Services	32.2	11.3	2.2	8.8	9.9	5.9	1.8	0.2	2.1
Business services	9.8	8.2	0.6	0.1	0.9	0.7	0.1	0.0	0.1
Health services	0.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Social services	<	0.0	0.0	<	0.0	0.0	0.0	0.0	0.0
Membership organizations	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Engineering and management services	21.7	3.0	1.6	8.0	9.0	5.1	1.7	0.2	2.0
Services n.e.c.	0.1	<	0.0	<	<	0.0	0.0	0.0	<

NOTE: Because of rounding, components may not add to totals.

KEY:
0 = Data were collected and the reported number or value was zero.
< = The estimated actual value is less than 50.
N.e.c. = Not elsewhere classified

SOURCE: National Science Foundation/SRS, using data from U.S. Department of Labor/Bureau of Labor Statistics, Occupational Employment Statistics Survey

APPENDIX. TECHNICAL NOTES

Scope of the Survey

The Occupational Employment Statistics (OES) Survey[1] is the source of extensive and detailed data on employed scientists, engineers, and technicians (SETs) in U.S. industry. It is conducted in 3-year cycles: Manufacturing industries are surveyed in the first year; mining, construction, and financial and other service industries in the nonmanufacturing sector are surveyed in the second; and trade, communications, transportation, and public utilities are surveyed in the third year. Data in this report are from the 1990 Nonmanufacturing Industries Survey, covering Standard Industrial Classification (SIC) codes 10-17, 60-80 except 806, 81, and 83-87 . The reference dates of the survey were the weeks that included April 12, May 12, or June 12, 1990, depending on the SIC code of the sampled unit. The survey covered all 50 States and the District of Columbia.

Method of Collection

Survey forms for the OES Survey are mailed to personnel offices of most sample establishments. In a few cases forms are mailed to the company headquarters. The responses supplied by the companies are then separated according to establishment by the Regional Office in which the company headquarters is located. The Regional Office then forwards the data to the state in which the respective establishments are located. Nonrespondents receive two additional mailings at 6-week intervals with telephone followups. Responses from the larger companies are critical to the survey. When they do not respond to the mailed questionnaire, but will provide the data in person, survey field personnel arrange a meeting for this purpose.

Survey questionnaires are tailored for specific industries at the 2-digit SIC level so that data can be aggregated at that level. The survey is conducted at the more detailed 3-digit SIC level. Each industry surveyed receives a separate questionnaire in which the job categories reflect the jobs of all or almost all employees in that industry. On the questionnaires, specific jobs are grouped under broad headings, each with a residual category for jobs not explicitly listed on the survey form. Abbreviated survey forms that combine kindred jobs are sent to small establishments to diminish the reporting burden and to encourage participation.

Impacts of Data Collection Methodology on Survey Estimates

The data collection methodology used in the OES Survey is such that several problems must be taken into account when using the data. First, the OES survey may sometimes understate employment in specific fields. If an occupation is very small in an industry, it will not be explicitly listed on that industry's questionnaire. For example, there are few biologists in the Communications industry, and thus the occupational category "biologist" is not on the survey questionnaire; rather, the more aggregated category of "life scientist" is used. Further, if past surveys had found few "life scientists" in an industry, the "life scientists" would be put in the even more aggregated category of "all other professionals," for which data would not be included in this report. This survey characteristic can be expected to overstate cross-industry differences in staffing patterns. Finally, BLS in 1988 increased the number of industries in which S&E managers were separately identified (see "Reconciliation with 1987 OES Data").

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[1] A description of the OES Survey can be found in the Department of Commerce, ***The National OES-Based Industry-Occupational Matrix, 1982 and 1995*** (Springfield, VA.: National Technical Information Service).

Data in this publication on R&D scientists, engineers, and technicians (R&DSETs) are the first such estimates published for nonmanufacturing, and refer to those who spend the "greatest proportion of time... on R&D." Scientists, engineers, and technicians who spend less time on R&D are excluded from this R&DSET subset, but are included in the overall SET estimates. Thus, the R&DSET numbers herein are not intended as full-count estimates.

Job and Industry Classification

Data collected in the OES Survey are for approximately 60 SET jobs, and are classified according to the ***Dictionary of Occupational Titles*** (DOT) and the ***Standard Occupational Classification System*** (SOC). The DOT system is used to develop single job categories and definitions because its classification scheme is detailed; the broad job categories used in this report are SOC categories. These two classification systems combined form the job classification system used in this report, as well as for all OES estimates.

Surveyed industries are classified according to the SIC coding System, revised in 1987. Reporting establishments are categorized on the basis of their major product or activity during the previous calendar year.

Reconciliation with 1987 OES Data

The OES Survey depicts the structure of total employment by industry, including SET personnel. The 1987 revisions to the SIC coding system were used in the 1990 OES Survey, so that only all-industry SET estimates in this report are fully comparable with those of the 1987 report. The numbers of SET personnel in most 2-digit level industries are largely or fully comparable for 1990 and 1987, except for Engineering and Architectural Services, Noncommercial Research Organizations, and Accounting, Auditing, and Bookkeeping, all of which were in SIC 87 in 1987 and are now in SIC 89. At the 3-digit SIC level, relatively fewer industries have comparable data for 1990 and 1987. The titles of some industries changed, but such industries neither gained from nor lost SETs to other industries.

Data for all SET personnel are given in table A-1 by 2- and 3-digit levels of industry, in table A-2 through A-4 by 2-digit level of industry, and in table A-5 by 3-digit level of industry. Tables A-6 through A-9 concern only R&D personnel and otherwise correspond to tables A-1 through A-4.

The numbers of SET managers in this report should not be compared with those published in ***Scientists, Engineers, and Technicians in Nonmanufacturing Industries: 1987*** (NSF 89-321). The 1990 OES Survey found 115,200 SET managers, versus 84,300 in 1987. A small part of this increase may reflect enhanced reporting of scientific and technical managers in 1990 when some small industries began reporting SET managers as a separate survey item.

Several computer-related occupations also are not fully comparable for 1987 and 1990. Some personnel in electrical and electronics engineering in 1987 will now be found in the new category of computer engineer or in the computer analyst category. Computer engineers are now a subset of "other" engineers.

Reconciliation with Other SRS Data Series

NSF supports three surveys covering scientists and engineers in industry: The OES Survey, the Survey of Research and Development in Industry (RDI), and the Scientific and Technical Personnel Data System (STPDS). These surveys cover different aspects of science and engineering (S&E) employment and characteristics. Because the survey definitions, concepts, coverage, and methods of collection vary widely, the resulting estimates differ. Two of the survey questionnaires are completed by employers. One, the OES Survey, occurs at the establishment (workplace) level. The other, the RDI Survey, occurs at the company headquarters level. The STPDS questionnaires are population-based, i.e., they are completed by the scientists and engineers themselves.

The data from the 1990 OES Survey herein cover total SETs and the R&DSET subset. The OES Survey, conducted by the Bureau of Labor Statistics (BLS), is an establishment-based survey of nonfarm employers who report the employment of their wage and salary workers by job type. NSF supports this survey to obtain estimates of the numbers in SET jobs. Published data provide job and industry detail.

The RDI is a company-based survey of R&D-performing firms conducted by the Census Bureau. Its primary objective is to provide statistics on R&D expenditures in U.S. industry. It also collects data on the overall full-time-equivalent (FTE) number of scientists and engineers who perform R&D in these firms. Unlike the OES and the STPDS Surveys, the RDI Survey excludes social scientists. The data provided cover only total numbers of R&D personnel. Further details are in the report titled ***Research and Development in Industry: 1989*** (NSF 92-307).

The STPDS comprises a series of surveys that provides data on employment and other characteristics of personnel who self-classify as scientists (including social and behavioral scientists) and engineers. The STPDS estimates include some personnel employed in non-S&E jobs. They are categorized by occupational and degree field, sector of employment (business, government, academia, etc.), and primary work activity (R&D, teaching, etc). Unlike the OES and RDI estimates, the STPDS estimates do not provide industry detail. For further information see the report, ***U.S. Scientists and Engineers: 1988*** (NSF 90-314).

Concepts

An establishment, such as a factory, is the primary sampling unit in the survey. In general, it represents a single physical location and engages in one type of economic activity.

This report covers several types of personnel: Full-time and part-time workers; workers on paid vacation or on other types of leave; workers on unpaid short-term absence; salaried officers, executives, and staff of firms; employees temporarily assigned to other units; and employees for whom the unit is a permanent duty station. Excluded from coverage are proprietors (owners and partners of unincorporated firms), unpaid family workers, and workers on extended leave.

The data on scientists and engineers in this report relate to their employment in S&E jobs, rather than to their education or training. Employees are categorized as scientists or engineers if they work at a level of knowledge equivalent to that acquired by completion of a 4-year college course with a science or engineering major, even if a college degree was not obtained. Employees who perform multiple functions are reported in the job requiring the highest level of such knowledge. Supervisors who spend at least 20 percent of their time doing work similar to that of individuals under their supervision are classified in the job category most closely related to their work duties.

Sampling Procedures

The OES Survey is a probability sample with a sampling frame based on lists of establishments covered by State Unemployment Insurance (U.I.) systems. Because each cooperating State selects its own sample, the reference date of the sampling frame varies according to when the last sample frame was updated and the survey was conducted. The reference date for sampling in the States BLS surveyed was the second quarter of 1990.

The survey universe is stratified by industry and size of establishment unit because these characteristics are believed to be primary determinants of job staffing patterns. Nine size-classes are represented, based on numbers of people employed: 1 to 4, 5 to 9, 10 to 19, 20 to 49, 50 to 99, 100 to 249, 250 to 499, 500 to 999, and 1,000 and over. Because U.I. reporting units with one to three employees are not sampled in every State, units with four to nine employees receive larger weights to represent employment in the smaller size-classes. Reporting units with 250 or more employees are included in the sample with certainty. Samples for noncertainty size-classes are developed to produce State estimates with target relative errors of 10 percent, 15 percent, or 20 percent at one standard deviation. This is done for SIC groups based on averages of occupational rates and coefficients of variation (CVs) from the previous survey of those groups for a set of typical occupations. This SIC sample-size is allocated to the classes in proportion to their employment. The sample is selected systematically with equal probability within each State/Area[2]/SIC/ size-class cell. Establishments with 250 or more employees are certainty units in the sample. States have the option of targeting relative errors of 10 percent, 15 percent, or 20 percent for noncertainty size-classes. Some States vary the target relative error by SIC to decrease the cost by reducing the sample size.

Response

Of the reporting units selected, 286,025 were eligible, i.e., those out of business and out of scope were excluded. Usable responses were obtained from 226,974 units. The response rates were 79.4 percent based on units and 75.7 percent based on weighted employment. Subsequent to the close-out date for National estimates, additional data were obtained by the States and used to prepare their respective state estimates. Thus, response rates in most States were higher than the rate used to develop national estimates.

Occupational Estimation

Weights for the sample units for which usable responses are received reflect two factors. Each weight is based on (1) the reciprocal of the probability of selection and (2) the nonresponse adjustment factor. For questionnaires that were not returned or were otherwise unusable, a nonresponse adjustment factor was calculated to impute for the missing data. For each of the 3-digit SIC/State/size-class sampling cells, the nonresponse factor is calculated as follows:

$$\frac{\text{Weighted employment of all eligible units in sample}}{\text{Weighted employment of all responding eligible units}}$$

Sample employment for this ratio is taken from the sampling frame. If the nonresponse adjustment factor in a cell exceeds a predetermined maximum factor, which increases with the number of respondents in the cell, the cell is collapsed with other homogeneous cells within an SIC until the nonresponse adjustment factor for that combined cell is not greater than the appropriate maximum factor. Homogenous cells are adjacent size cells within a State and SIC. If the collapsing procedure terminates (i.e., no more cells are available for collapse) before satisfying the constraint above, then the most recent maximum factor is used. The weight for each unit is the product of the nonresponse adjustment factor and the reciprocal of the probability of selection.

A separate ratio estimate of occupational employment is used to develop national estimates. The auxiliary variable used is the 1990 population value of total employment. The estimated employment for an occupation at the 3-digit industry i/size-class j level is

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[2] Some states further stratify their samples by substate areas.

$$\hat{P}_{ij}=\left(\sum_{k} W_{ijk}P_{ijk}\right)\left(\sum_{k} \frac{M_{ij}}{W_{ijk}E_{ijk}}\right)$$

where i = a 3-digit industry

j = size-class

k = establishment

$\hat{P}_{ij}$ = estimated employment for occupation P in industry i and size-class j

W_{ijk} = weight for establishment k in industry i and size-class j after adjusting for nonresponse

P_{ijk} = reported employment for occupation P in establishment k within industry i and size-class j

E_{ijk} = reported total employment for establishment k in industry i and size-class j

M_{ij} = population value of total employment for industry i and size-class j.

The population value of total employment (M_{ij}) was obtained from the BLS Universe Data Base files for the reference month of the industry.

The estimated employment for an occupation at the 3-digit industry i level is obtained by summing the occupational employment estimates $\hat{P}_{ij}$ across all 3-digit industries j within industry i.

$$\hat{P}_{i}=\sum_{j=1}^{L_i} \hat{P}_{ij}$$

Where L_i is the number of size levels j in industry i.

Similarly, the estimated employment for an occupation at the 2-digit industry g level is obtained by summing the occupational employment estimates $\hat{P}_i$ across all 3-digit industries i within industry g.

$$\hat{P}_g = \sum_{i=1}^{L_g} \hat{P}_i$$

Where L_g is the number of three-digit industries i in industry g.

Variance Estimation

Estimates of sampling error are calculated on survey estimates to allow users to determine whether or not the occupational estimates are reliable enough for their needs. Only a probability sample can be used to estimate sampling error from the sample itself.

The formulas used to estimate the variance, a common measure of sampling error, are based on both the sample design and the method of estimation. In the OES Survey, the formula used to estimate the variance of occupational employment is a subsample replication technique called the jackknife random group. The jackknife derives estimates of occupational employment from each of R subsamples of the parent sample by leaving out one random group at a time, and then estimates the variance of the occupational employment figure from the variability between the R employment estimates.

The variance for an occupational employment estimate at the 3-digit industry i for size-class j level is

$$S^2(\hat{P}_{ij}) = \frac{1}{(R)(R-1)} \sum_{r=1}^{R} (\hat{P}_{ijr} - \hat{P}_{ij})^2$$

Where

R = number of random groups

$\hat{P}_{ij}$ = estimated employment for occupation P in industry i and size-class j

$S^2(\hat{P}_{ij})$ = estimated variance of $\hat{P}_{ij}$

$\hat{P}_{ijr}$ = estimated pseudo employment for occupation P in industry i, size-class j, and subsample r

$\hat{P}_{ij}$ = estimated mean pseudo employment for occupation P in industry i and size-class j

The variance for an occupational employment estimate at the 3-digit industry i level is obtained by summing the variances $S^2(\hat{P}_{ij})$ across all size-levels j within industry i.

$$S^2(\hat{P}_i)=\sum_{j=1}^{L_i} S^2(\hat{P}_{ij})$$

Where L_i is the number of size levels j in industry i.

Similarly, the variance for an occupational employment estimate at the 2-digit industry g level is obtained by summing the variances $S^2(P_i)$ across all 3-digit industries within industry g.

$$S^2(\hat{P}_g)=\sum_{i=1}^{L_g} S^2(\hat{P}_i)$$

Where L_g is the number of 3-digit industries i in industry g.

Reliability of Estimates

Estimates developed from a sample may differ from the results of a complete census of all the establishments in the sampling frame. Two types of error, sampling and nonsampling, are possible in an estimate based on a sample survey. Sampling error occurs because observations are made only on a sample, not on the entire population. Nonsampling error can be attributed to any of many sources: an inability to obtain information about all cases in the sample; differences in the respondents' interpretation of questions; inability or unwillingness of respondents to provide correct information; errors made in recording, coding, or processing the data; errors made in estimating values for missing data; and failure to represent all units in the population.

The particular sample used in this survey is one of a large number of possible samples of the same size that could have been selected using the same sample design. Estimates derived from the different samples would differ from each other. The deviation of a sample estimate from the average of all possible samples is called the sample error. The standard error of a survey estimate is a measure of the variation among the estimates from all possible samples. Thus, it is a measure of the precision with which an estimate from a particular sample approximates the average results of all possible samples. The relative standard error is the standard error of the estimate divided by the value being estimated. The variance is the standard error squared. In this report, the term "relative error" is synonymous with the term "relative standard error."

The sample estimate and an estimate of its standard error allow construction of interval estimates with prescribed confidence that the interval includes the average result of all possible samples obtainable from the sample design for this survey.

To illustrate, if all possible samples were selected, and each of these was surveyed under essentially the same conditions as the others, and an estimate and its estimated standard error were calculated for each sample, then;

(1) Approximately 68 percent of the intervals from one standard error below to one standard error above the derived estimate would include the average value of all possible samples.

(2) Approximately 90 percent of the intervals from 1.6 standard errors below to 1.6 standard errors above the derived estimate would include the average of all possible samples.

(3) Approximately 95 percent of the intervals from two standard errors below to two standard errors above the derived estimate would include the average of all possible samples.

(4) Almost all intervals from three standard errors below to three standard errors above the derived estimate would include the average of all possible samples.

An inference that the value based on the whole population would be within the indicated ranges would be correct in approximately the foregoing frequencies. For example, suppose an estimated employment total is 5,000 with an associated relative error of 2 percent. Based on these data, the standard error is 100 (= 5,000 X 0.02) and the 68 percent confidence interval is from 4,900 to 5,100 (5,000 + or - 100). A conclusion that the actual total employment lies within a range computed in this manner would be correct for roughly 68 percent of all possible samples.

Relative standard errors indicate the potential magnitude of the sampling error but do not measure biases in the data resulting from nonsampling error. Many edit and quality control procedures are used to reduce the biases arising from errors in recording, coding, and processing the data. The adjustments made for nonrespondents assume that their characteristics are the same as those of the respondents in a given 3-digit SIC/State/size-class sampling cell. To the extent that this is not true, bias is introduced into the data. The magnitude of these biases is unknown.

Particular care should be exercised when interpreting estimates based on a small number of cases, or on small differences between estimates, because of relatively large sampling errors and the unknown magnitude of the nonsampling biases. In general, an employment estimate that has a relative standard error of zero (0.0) percent indicates that the estimate has no sampling error. An estimate with a relative standard error of zero (0.0) does not imply that the estimate is perfect, especially since the estimate is also subject to non-sampling error (e.g., non-response error).

Quality Control Measures

As was mentioned earlier, the OES survey is a Federal-State cooperative effort which enables States to conduct their own surveys. A major concern with a cooperative program like OES is accommodating State specific publication needs with limited resources while standardizing survey procedures across all fifty States and the District of Columbia in order to produce high quality estimates. The control on sources of nonsampling error in this decentralized environment can be particularly difficult. In addition, the review and validation function is spread across eight regional offices, thus leading to procedural differences between regions. Examples of quality control measures employed by BLS are the Survey Processing and Management System (SPAM) and the Estimates Delivery System (EDS), which were developed to provide a consistent and automated framework for State procedures and to reduce the workload at State, regional, and national levels.

By standardizing data processing activities (i.e., validating the sample frame , allocating and selecting the sample, refining mailing addresses, addressing envelopes and mailers, editing and updating questionnaires, producing management reports, and producing estimates) across all States, SPAM and EDS have also standardized the survey methodology. This has significantly reduced the number of errors on the data files as well as the time needed to review them.

Other quality control measures used in the OES survey include:

- follow up solicitations of nonrespondents (especially critical respondents),
- review of schedules to verify the accuracy and reasonableness of the reported data,
- adjustments of a typical data reporters,
- validation of the nonresponse adjustment factors,
- validation of the benchmark employment figures and of the benchmark factors, and
- validation of the analytical tables of estimates (at the two and three-digit SIC levels).